LIBRARY OF CONGRESS
APR 23 1894
SMITHSONIAN DEPOSIT.

THE AMERICAN GAS LIGHT JOURNAL

REDMANRKENNY.N.Y.

PUBLISHING OFFICE No. 32 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME LX.—No. 17. Whole No. 985. | NEW YORK, MONDAY, APRIL 23, 1894. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager.
JOS. R. THOMAS, C.E., Editor. T. J. CUNNINGHAM, Asst. Editor.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND CLASS MATTER.

Published on each Monday of the year, at No. 32 Pine Street, N. Y.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $4.50 (19 shillings—22½ francs). All payments to be made in advance. Single copies, 10 cents.

The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

CONTENTS.

An Asterisk (*) denotes an illustrated article

OFFICIAL NOTICES—
Pacific Coast Gas Association, Second Annual Meeting 581
Seventeenth Annual Meeting, Western Gas Association..... 581
EDITORIALS—
Briefly Told 582
Obituary, Mr. F. A. Sabbaton—Death of H F. Allen—Notes.
Tenth Annual Meeting of the Ohio Gas Light Association—Official Report—Revised by the Secretary—Concluded from page 555 582
Second Day, Afternoon Session—Report from Committee on Nominations—Election of Officers—Gas for Fuel, by Mr. Donald McDonald—Discussion—Report of Committee on Place of Meeting—The Question Box—Adjourned.
*The Clayton Coal Tar Pump 590
The Briquette Factories at Blanzy, France..... 590
Working a Leaky Telegraph Line..... 591
A New Aluminum Solder..... 591
ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 591
Death of Mr. John Allan—Some Changes—Mr. C.V. Newman Goes to Peoria, Ills.—A Budget from the West—Mr. Aldrich on Mr. Anson's Paper at the Ohio Meeting—The Itinerant Meter Inspector at St Louis—Death of Mr. W. Y. Scott—Sale of the Doylestown (Pa.) Works—Public Lighting, Charlestown, Mass—Public Lighting, Montclair, N. J.—A Hint from Lawrence, Kas.—Cheaper Gas for Oakland, Cal.—Sale of the Vallejo (Cal.) Plant—Cheaper Gas for Bridgeton, N. J.—Annual Meeting, Rome, N. Y.—Mr. C. F. Smith Goes to Lebanon Pa.—Will the Louisville Company Increase Its Capital—Figures Furnished by the Gas Commissioners Anent Boston Gas Bills—Interesting Proceedings, Dominion Parliament—And Other Items.
The Market for Gas Securities 594

[OFFICIAL NOTICE.]

Pacific Coast Gas Association, Second Annual Meeting.

OFFICE OF THE SECRETARY, OAKLAND, CAL., March 5, 1894.

Upon the suggestion of Mr. Jos. B. Crockett, our President, and with the concurrence of the Directory, it has been decided to hold the next meeting of this Association at Sacramento, on Tuesday and Wednesday, the 15th and 16th of May, 1894.

This has been done to afford an opportunity to members to combine the business of our annual conclave with the pleasure of a visit to the Midwinter Fair, as the time appointed by the by-laws would be after the Fair had closed, and many if not all of the members who live at a distance from San Francisco will thereby be saved the necessity of making two trips to the bay.

Our first meeting was a complete success—the second will not be behind it in interest. Already papers are promised upon topics of interest to gas men, among them being "Practical Analysis of Gas," illustrated with complete apparatus, "Proper Books of Record for Gas Companies," and "Prepayment Meters."

Each member's presence is necessary to the preservation of an organization whose ultimate object is the bringing together in unity of thought and action the gas fraternity. Come prepared to ask questions, to give and receive information. The good accomplished by the last meeting has been felt throughout the year in better results of manufacture and distribution. The pertinent question personally asked and answered is productive of more results than volumes of print.

In order that arrangements may be made for your care and comfort while at Sacramento, please advise me on receipt of this if you intend to be present. You will be later advised concerning headquarters, place of meeting, hotel accommodations, etc.

We want at this meeting a perfect circulation of members, and no dead ends. Yours very truly, JOHN A. BRITTON, Secretary.

[OFFICIAL NOTICE.]

Seventeenth Annual Meeting, Western Gas Association.

SECRETARY'S OFFICE, WESTERN GAS ASSOCIATION, QUINCY, ILLS., April 16, 1894.

The seventeenth annual meeting of the Western Gas Association will be held at Cleveland, O., on the 16th, 17th and 18th of May.

The Hollenden, strictly first-class in all its appointments, will be the Association's headquarters, and its business sessions will also be conducted therein. The rates at the Hollenden will be as follows: On the American plan, $3, $3.50, $4 and $5 per day. On the European plan, $1, $1.50, $2, $3 and $3.50 per day.

It is intended that an exhibit of gas appliances shall form one of the prominent features of the Cleveland meeting, and to this end a commodious storeroom, directly across the street from the Hollenden, has been engaged. Manufacturers and dealers in stoves, ranges, burners, lamps, engines and all forms and types of apparatus or machinery by which the manifold uses of gas can be exhibited, are respectfully invited to display their wares; and they can feel assured that, on this occasion, the same will be critically inspected by large and appreciative audiences. Communications on the subject can be addressed to Mr. M. S. Greenough, General Manager of the Cleveland Gas Light and Coke Company, who will take pleasure in furnishing to exhibitors all requisite information in the matter.

The following papers will be presented for the consideration of the members of the Western Gas Association on the occasion of its seventeenth annual meeting:

"Street Main Pressures," by Irvin Butterworth, Columbus, O.

"Some of the Advantages of Oil Gas Works for Small Towns," by J. W. Stratton, Valparaiso, Ind.

"The Best Method of Introducing Gas Stoves," by H. Wilkiemeyer, Evansville, Ind.

"Three Years in a Country Gas Works," by S. M. Highlands, Clinton, Ia.

"History of the Gas Meter," by Wm. McDonald, Albany, N. Y.

"How to Make Small Electric Light Plants Pay," by I. C. Copley, Aurora, Ills.

"Influence of Temperature on Purification," by Jas. Ferrier, Columbus, Ga.

"Report of the Committee on Electrolysis," by Geo. T. Thompson, Jas. Somerville and Alten S. Miller.

Paper by Chas. H. Evans, Chicago, Ills., title not yet received.

Geo. T. Thompson, of the Laclede Gas Light Company, St. Louis, Mo., has been appointed Superintendent of the Wrinkle Department for the coming meeting, and to him should be addressed all contributions to or communications bearing on subjects connected with said department, while all matter for the Question Box should be mailed to the Secretary.

Rates of one and one-third fares for the round trip will be made, by the various Passenger Associations, to our members and their friends. This reduction is based on the certificate plan, as in former years.

The undersigned will be pleased to reply to all communications requesting detailed information concerning the meeting, not covered by this announcement and the notices which are to follow.

A. W. LITTLETON, Secretary.

BRIEFLY TOLD.

OBITUARY, FREDERICK A. SABBATON.—On the 14th inst., death closed the earthly career of Mr. Frederick A. Sabbaton, who for more than 30 years was a resident of Troy, N.Y., and who for over two score years had been prominently identified with the gas industry of America. His demise was the sequel to a long and tedious illness. Through the attention of Mr. Paul S. Merrifield, of this city, we are enabled to place before our readers the following history of Mr. Sabbaton's life.

Frederick A. Sabbaton was born in this city, on March 16, 1830, and at the age of 18 mastered the then art of telegraphing, making practical use of that knowledge in the office of the Superintendent of the Philadelphia and Reading Railroad, at Mount Carbon, near Pottsville, Pa. In 1851 he took charge of the gas works at Poughkeepsie, N.Y., as Superintendent, and in the following year opened a gas fixture store in Elmira, N.Y., at which time his brother (Joseph A.) was engaged in constructing the Elmira gas works. In 1854, in conjunction with his brother, Joseph A., he erected the Cohoes (N.Y.) gas works, and the year following we find him engaged in working up the ammoniacal liquor from gas works, the apparatus for which was in buildings located on the corner of 18th street and 10th avenue, New York. In 1856 he took charge of the Middletown (Conn.) gas works, remaining there for a year. In 1857 he built the gas works at Northampton, Mass., and in the following year completed the Albion (N.Y.) plant, and also put down the pipe system for the supply of Fredonia, N.Y., with natural gas. In 1859 he built the Brockport (N.Y.) works, following which operation he went to Brooklyn to assist in the construction of the works of the Citizens Gas Light Company. His brother Tyler was then in charge of the Citizens works as Engineer. In 1860 he finished a small works at Saugerties, N.Y., the proprietor of which was Mr. George H. Kitchen, and also completed a small gas plant for the owners of a hotel at Kingston, N.Y. In 1861 he built the Jamestown (N.Y.) works, in which enterprise the late General Charles Roome was largely interested. In 1862 he accepted the position of Engineer and Superintendent to the Troy (N.Y.) Gas Company, a post that he filled with much success and from which he retired (1890) because of failing health. While with the Troy Company he did much outside work, as the following record will attest. In 1862 he built a small plant to the order of the Harmony Mills proprietors, Cohoes, N.Y.; in 1863 constructed the East Albany (N.Y.) works; and in 1864 built a new plant for the Cohoes Company and also the works at Little Falls, N.Y. In 1868-9, in conjunction with his father and Messrs. Gale, Lockwood & Block, he engaged in the manufacture of aniline colors, which business was subsequently sold out to an Albany firm. In 1872 he was largely instrumental in the organizing of the Peoples Gas Light Company, of Albany, N.Y., and acted as Engineer to the enterprise, also sharing with the late Henry J. Davison the contracts for its buildings. In 1879 he built a new works for the Hoosick Falls (N.Y.) Gas Light Company, and in the same year was elected a Trustee of the American Meter Company; a position held by him until 1888. At the time of his death he was President of the Glens Falls, East Albany and Whitehall Gas Light Companies, and was also a member of the Directorate of the Albion Company. This record shows how closely deceased was identified with the gas interest, more particularly in respect of its development in this State, and it can be truthfully said that his restless energy well repaid him. He may be said to have inherited his engineering talent, for his father (Paul A. Sabbaton) was a prominent engineer of New York in the time of Robert Fulton, whose friend and co worker he was. Deceased was elected to membership in the American Gas Light Association at the 1873 meeting, and some years ago was a prominent figure at its meetings, and was also a charter member of the Society of Gas Lighting. In 1869 he became united in marriage to Miss Mary Follette, of Brockport, N.Y., who survives him, as do two sons—Paul and Frederick A., Jr. The funeral services were held in Troy on the 17th inst., the Rev. Mr. W. R. Freeman, Rector of St. John's Church, officiating, and interment was made in the Troy Rural Cemetery. The passing from earth of Mr. Sabbaton marks the death of an accomplished engineer whose contemporaries were never slow to acknowledge his ability, and who accorded him the respect due to an honorable man.

DEATH OF MR. HENRY F. ALLEN.—It is our mournful duty to report the death of Mr. Henry Frederick Allen, Superintendent of the New York Mutual Gas Company, who died suddenly at his home in this city on the evening of the 16th inst. The funeral services were celebrated on the afternoon of the 18th inst., at his late home, the Reverend Frank Rogers Morse, of Calvary Baptist Church, officiating. The large assemblage present held many members of the Society of Gas Lighting, of which body deceased was an esteemed member. In our number for next week we hope to give some account of his life.

NOTES.—In our item columns will be found some mention of a probable issue of new stock by the proprietors of the Louisville (Ky.) Gas Light Company, coupled with the statement that the Directors deny the likelihood of such issue. It seems, however, that the Directors did not quite mean their denial, since later advices are to the effect that a special meeting of the stockholders was to have been held on Saturday last to discuss the advisability of increasing the Company's capital in the sum of $500,000.——The annual meeting of the engineering division of the United Gas Improvement Company was held last week in the Continental Hotel, Philadelphia. The proceedings were in the nature of an executive session, and the attendance was most satisfactory.——Mr. Thomas G. Lansden, of Washington, D. C., has instituted a libel suit against Mr. E. C. Brown and others interested in the publication of a paper in this city, which appears semi-monthly. Mr. Lansden places his damages at $50,000, and the suit is based on an article which appeared in the publication referred to.

[OFFICIAL REPORT—REVISED BY THE SECRETARY—CONCLUDED FROM PAGE 555.]

TENTH ANNUAL MEETING OF THE OHIO GAS LIGHT ASSOCIATION.

HELD AT COLUMBUS, O., MARCH 21 AND 22, 1894.

SECOND DAY—AFTERNOON SESSION.

The first business was the reading of the following

REPORT FROM THE COMMITTEE ON NOMINATIONS.

We, the Committee on Nominations, beg to submit the following report: For President, J. W. R. Cline, of Springfield, Ohio; for Vice-President, W. W. Cantine, of Alliance, Ohio; for Secretary and Treasurer, A. P. Lathrop, of Columbus, Ohio; for Executive Committee, W. C. Boyle, of Salem, O.; T. C. Jones, of Delaware, O., and E. T. McCormack, of London, O., to fill the vacancy.

C. R. FABEN, JR.,
EUGENE PRINTZ,
JEROME PENN. } Committee.

ELECTION OF OFFICERS.

The President—Gentlemen—The Nominating Committee has done an excellent work and has made nice provision for our future. What shall be done with the report? I will entertain a motion that the Secretary cast the vote of the Association.

On motion, the President cast the ballot of the Association for the election of the persons named as officers, and the Chairman announced that the Association would be glad to hear from Mr. Cline, the President-elect.

Mr. Cline—Mr. President and Gentlemen of the Association: I desire to thank you for the high honor you have conferred upon me by selecting me as your President for the ensuing year. It shall be my pleasure to give my best efforts in maintaining the high standard which the Association has attained. I know I shall have your cordial support, which is essential to success and which I shall very much appreciate.

The President—If Mr. Cantine is not in the room we will now proceed with the reading of the paper, by Mr. Donald McDonald, on the subject

GAS FOR FUEL.

To the President and Members of the Ohio Gas Light Association:

Gentlemen: In taking up the subject of gas for fuel, I want it distinctly understood that I do not mean "fuel gas," whether it is spelled "fuel" or "fool." I am not one of those who believe that any process will ever be discovered by which nitrogen can be burned or can be made to aid combustion, or that any alchemist will ever succeed in greasing 1 cent's worth of wind with 2 cents' worth of oil, and making a dollar's worth of gas out of it. On the contrary, I am sure that, if gas is ever successful as a fuel, the first requisite will be that it shall be good gas.

It has been a good many years since gas managers first began to indulge the hope that they could find a daylight market for their product in the use of gas for fuel. The progress made in that direction has, however, not been very gratifying, and when natural gas entered the field with its very low cost, and its absolute freedom from condensation, and some other objectionable features of artificial gas, it looked as if the day of artificial gas fuel had been indefinitely postponed. Natural gas has, however, proved a blessing in disguise; and there are now two powerful forces working from different directions tending to hasten the day of this very desirable change. One of these is the competition of the electric light, which is driving gas companies to find another outlet for their product. The other is the steady falling off of the supply of natural gas, which is forcing communities to look for a means of making gas for fuel, and forcing on the natural gas companies the choice between solving this riddle or allowing their pipes and mains to lie idle and be eaten up with rust. Fortunately, natural gas does not fail all at once, and companies which are sore pressed for gas in January and February have a large excess for sale in June and July; they can, therefore, easily afford to make artificial gas at a very small profit, or even at a loss, during these two months, if by so doing they are able to hold enough consumers to double their income during the balance of the year.

Having mentioned the forces which are urging on this change, I will name a few of those which are retarding it. The first proceeds from the greased-wind people, who by claiming to get more heat in the gas than existed originally in the substances out of which the gas was made, while at the same time claiming the ability to sell the gas at a price which would make it cheaper than coal, have induced the public and

the gas men to believe that the whole thing is a swindle, and that all such projects must necessarily break down.

Another retarding force is the tendency to attempt to use gas for purposes where its cost, and other properties, make its failure a foregone conclusion. For cooking, or for occasional fires, gas can be used with economy at a dollar a thousand; but the man who attempts to heat a bed room or an office with it at that price, will certainly become disgusted with the whole business, and will very properly blame the gas company that induced him, or allowed him to waste his money on such an experiment. With a good gas at 50 cents a thousand, all sorts of cooking can be done with it, and the heating of parlors and dining-rooms, and those bed-rooms which are not used as sitting rooms during the day, can be done at a cost so little greater than the cost of coal, that people will put up with it on account of the greater convenience of gas. At 35 cents a thousand for a good gas containing, say, 700 heat units, gas can be used as a heating agent all over a residence, and the cost will not exceed that of anthracite coal at $8 a ton, or soft coal at $3.50 a ton, after allowance is made for kindling and labor. Thirty five cents a thousand will sound like a high price to those of my friends who are selling natural gas, while it will sound like absolute starvation to those who sell only illuminating gas. If it is granted, however, that the sales of illuminating gas can be made four times as great in the daytime as they are at night, while not one dollar additional cost need be charged for interest, repairs, maintenance of lines, reading of meters or clerk hire, I believe that most gas engineers will admit, where coal and oil are cheap and other conditions favorable, they would be very willing to have a very large daytime consumption of gas at a price approximating this figure.

The question of what the consumer can afford to pay for gas for fuel is one certainly as important as the question of what price the company can afford to make the gas for, and one on which very little talent is expended, and one which ought to receive at least as much attention as the proper management of the gas works.

If gas at 50 cents a thousand is burned in a good gas stove, in a tolerably close room, without any chimney draft, the products of combustion escaping into the room, the amount of gas required to heat the room will be so small that coal will not compete with it in price. The room, however, if it is small and close, will become unfit for habitation, owing to the consumption of the oxygen of the air, and the formation of carbonic acid and watery vapor.

Nearly all persons using such a fire think that they find it necessary to hang a brass kettle in front of the grate, so as to evaporate water, and in this way avoid what they call "the dry heat." It is nevertheless true that the consumption of 1 pound of natural gas makes 2 pounds of steam, and unless this steam goes up the chimney, or escapes through the accidental openings in the room, it will condense on the windows in such quantities as to make them actually opaque in freezing weather. I do not know that the presence of this watery vapor is in any way injurious to health, but unfortunately the carbonic acid produced by this combustion is unquestionably injurious, and the oxygen which is taken from the air is one of the prime requisites of life, and cannot be removed with impunity. All persons with any knowledge of chemisty will admit these statements, and yet I know, of my own knowledge, rooms which have been heated for three years past by means of stoves placed out in the room, with no draft whatever, and the occupants of the rooms have not only lived and breathed, but, in the case of drug stores and other such places, have been annoyed with a great many loafers attracted thither by the steady warmth. Of course such rooms must have outlets, and, generally speaking, I have found that a stove of this sort, placed in the hall of a dwelling house, where the warm air can ascend to the second and third floors, fresh air being in the meantime drawn in to take its place, will not cause any serious inconvenience. I have found also that a bed-room heated in this way can be made hot in two or three minutes; and will contain a very pleasant atmosphere during the hour in the morning that the occupant is rising, or at night when he is retiring. To keep such a fire going all day and use the room as a sitting room is, however, very unwise; and whenever a room is used in this way the gas fire should either have a good draft, or a window should be lowered from the top, or some other means provided for allowing the products of combustion to escape and fresh oxygen to enter.

I am free to admit that I am a little skeptical as to the generally accepted theory that the presence of more than 13 parts of carbonic acid in 10,000 of air will render air unfit to be breathed. The purest mountain air contains 4 parts in 10,000, and I cannot believe that the human lungs are so delicately adjusted that the addition of 9 parts more to this amount would render the air intolerable. My reasons for skepticism on this point are two fold. The first is, that I have sat for hours and worked with perfect comfort in a room where I had purposely burned gas until the proportion of carbonic acid ran up to 15 parts in 10,000; and the second is, that a man's lungs exhale an average of .6 of a cubic foot of this gas each hour, which would keep the proportion actually in the lungs at any one time up to about 400 parts in 10,000.

One hundred cubic feet of natural gas weighs 4.287 lbs., is composed of 1.072 lbs. of hydrogen an 3.215 lbs. of carbon; it requires for its perfect combustion 969.3 cubic feet of air, weighing 74.561 lbs. It makes in burning 9.648 lbs. of steam and 11.788 lbs. of carbonic acid, equal to 100 cubic feet. It produces 94,593 heat units when the steam is not condensed. The total products of combustion are, therefore: Steam, 9.648; carbonic acid, 11.788; nitrogen, 57.412; total, 78.848 lbs. If these products of combustion escape at a temperature of 600°, they carry off with them 12,712 heat units, or about 14 per cent. of all the heat produced by the fire. If they escape at 300°, they carry off less than 7 per cent. Suppose, however, that for any reason twice as much air as is necessary to combustion passes through the fire and escapes up the chimney along with these products of combustion; at a temperature of 600°, we wou'd then have a loss of heat units equal to 23,332, or about 26 per cent. of all the heat produced by the fire. If three times as much air as is necessary for combustion be admitted and allowed to escape at 600°, then the loss is 40 per cent.

It must be remembered, however, that with a wide open chimney and a strong draft not only is the volume of air which escapes up the chimney increased, but also the temperature is apt to be high. We find, therefore, that if a fire takes in five times as much air as is necessary, and that it escapes at a temperature of 800°, then the loss will amount to 92 per cent. of all the heat produced by the fire.

A room 16 x 16 x 12 contains about 3,000 cubic feet, and will require 2,177 heat units, in order to bring its temperature up from 30° to 70°. If the combustion is perfect, and there was no other loss than that due to the actual products of combustion escaping at 300° F., such a room should be heated from 30° up to 70° with a consumption of 3 feet of gas per hour; or, assuming that the air is changed three times per hour, and that there is no loss through the walls or windows, 9 feet of gas per hour would keep such a room warm.

I was so much surprised at this low figure that I stopped the preparation of this paper long enough to construct a gas stove on this principle. It was of sheet iron, so constructed that no air could enter it except what was necessary for combustion, and this air was compelled to enter it at the very point where the flame originated. This I accomplished by using the ordinary burner composed of a piece of ¼ inch gas pipe, with holes ⅛ inch in diameter, drilled 1 inch from centers and fitted on the end with an ordinary mixer and stop cock, so arranged as to take in air and gas mixed, and provided with valves so that the amount of air and the amount of gas taken in were capable of absolute adjustment. This burner was placed inside of a 2½-inch pipe of the same length, with holes ⅜ inch diameter, in such a way that the jets of mixed air and gas issuing from the small pipe were projected through holes in the larger pipe, and, of course, met a supply of perfectly pure fresh air, drawn in from the outside. The stove was connected to the chimney by means of a 4 inch flue pipe, and there existed at all times a vacuum in the stove, so that whatever leaks accidentally existed in it served to take in air, but never to permit the escape of the products of combustion.

I found that with this stove I could maintain the temperature of a room 16 x 16 feet, with a 12 feet ceiling, at 68°, while the thermometer outside varied from 25° up to 35°, the consumption of gas being only 13 feet per hour, and the room being at all times sweet and wholesome.

I drew some air out of the interior of this stove and analyzed it, and found that its composition was as follows: Carbonic acid, 6½ per cent.; oxygen, 7 per cent.; and the remainder was, I presume, nitrogen. Of course, such an atmosphere as this would be absolutely fatal to any kind of life in a little while. A lighted candle placed inside of the stove goes out in a few minutes, and even a stream of gas poured in against the flames refuses to light for lack of oxygen with which to burn.

Now, let us assume that instead of allowing these products of combustion to escape up the chimney, that we allow them to escape into the room; the result would be that, at the end of the hour, the room would contain 13 feet of carbonic acid and a considerable quantity of watery vapor, and would have its supply of oxygen depleted by about 26 feet. Thus we have in one hour lowered the oxygen to 19 per cent., and raised the proportion of carbonic acid from the 4 parts in 10,000, at which it originally was, to 48 parts in 10,000, which is a great deal more than any of the authorities on ventilation allow, and which does as a matter of fact render the room in question exceedingly oppressive.

Of course the amount of gas required to heat the room by this last

method is somewhat less, but the difference is evidently not worth the cost at which it is obtained.

In pursuing this inquiry, I have examined the cuts of all the gas burning appliances which I could obtain; and in none of them do I find any attempt to separate the products of combustion from the surplus warm air before they reach the chimney. They all go on one or two theories; the first is to carry nothing up the chimney and allow everything to escape into the air of the room. This may be described as very cheap and very nasty. The other plan is to provide ample chimney draft and let the householder pay the bill. This is healthy enough, but it is very expensive.

I feel certain that gas will eventually take its place as the principal heating and cooking agent of the people. Before it can do so, however, the managers of gas companies must be prepared not only to make a good gas and sell it cheap, but also to instruct their patrons how to burn it, so as to secure economy in the cost and a wholesome atmosphere in their houses. As long as the public have to choose between extravagant gas bills and close, oppressive rooms, the progress of gas for heating will be slow.

The next question, and one equally important is, at how low a price can gas companies afford to sell a first rate gas. There is no doubt but that a natural gas company can afford to manufacture artificial gas to supply the deficiencies during cold weather and sell the mixture for 35 cents per 1,000, and even much cheaper. The question as to what illuminating gas companies can do in this line is one not so easily settled. Assuming, however, that none of the expenses of the illuminating gas company would be charged to the cost of furnishing the fuel gas, except the interest and repairs on the additional apparatus and the cost of the additional fuel and labor necessary to make the extra amount of gas, then I believe that a very fair profit would be found in selling 18 candle gas, to be used as fuel, at 40 cents per 1,000 feet. If this was done, and the attention of the public properly called to the advantages of this fuel, I believe I am not a false prophet when I say that the time would come when the receipts from gas sold for fuel would greatly exceed the receipts from gas sold for light.

With regard to the question of how this gas is to be made, I can only say that my experience in the line of making artificial gas is not long enough to entitle my opinion to any great weight on this subject. It is evident, however, that what is wanted is not cubic feet but heat units, and that, in order to get these heat units at a reasonable cost, we must get them from substances in which the heat exists at a reasonable cost; for instance, if gas containing 700 heat units per foot is to be sold for 40 cents per 1,000, then the cost of a million heat units is 57.14 cents. Now, then, if this gas is made entirely from naphtha distillate at 2½ cents per gallon, then each million heat units in the gas would cost the company, exclusive of labor and all other items, about 18 cents, provided all the heat in the naphtha could be gotten into the gas. As a matter of fact, however, only a percentage of the heat existing in the naphtha can be recovered in the gas, and I shall assume that this percentage is 60. On this basis the heat units in the naphtha gas would cost the company, for gas making material alone, 30 cents per million, With coke at $3.50 a ton, rating it at 14,000 heat units per pound, and assuming that the same percentage will be recovered, the gas would cost the company 19 cents per million heat units. With soft coal at $1.50 a ton, 14,000 heat units per pound, and the same assumption as to the percentage of heat to be recovered in the gas, we would have a cost to the company of 8.9 cents per million heat units. These figures seem to force the conclusion that, when gas is made at a price low enough to be sold as a general heating agent, it will be made with soft coal, and may or may not be enriched with crude oil or naphtha.

Having come to the conclusion that cheap gas must be made out of soft coal, the next question is, by what process can it best be made? Of course the coal can be distilled off in retorts in the ordinary way, yielding about 10,000 feet of gas for each ton of coal, and the coke can then be placed in a water gas apparatus, and, by passing steam through it, about 30,000 feet of water gas can be made, giving a yield of 40,000 feet of gas to a ton of coal, not counting coal burned under boilers, or fuel used for heating retorts.

This process would be very wasteful of labor, and also wasteful of heat, as it requires the coke to be first cooled down, and then, after moving it to another apparatus, to be heated up again.

I am going to describe the machine now in use at our works in Louisville, which performs both of these operations in the same apparatus. The machine can be described as four upright retorts, or generators, and one superheater, all set around in a circle, making a cylinder 16 feet in diameter and 20 feet high. Soft coal is charged into three of these retorts, and coke into the fourth. Air is then driven up through the three coal chambers, burning a portion of the coal and heating them to a high temperature; the resulting hot gases being in the meantime carried down through the coke, in this way heating it up without burning it. The heat necessary to start the blast, and also that required to bring the coke to the finishing temperature, is gained by a short blast upward through the coke. When the machine has been brought to the right heat, and before the blast is stopped, a charge of soft coal is dumped into each one of the coal chambers. The blast is then stopped and steam turned under each of the coal chambers, and oil turned in at the top of the coke chamber. The result is that water gas is produced in each of the coal chambers, and, mingling with the coal gas distilled off from the fresh charge of soft coal, passes over to the coke chamber, down through the red-hot coke, where it has the vapors of oil changed into fixed gases, and up through the superheater, where this process is thoroughly completed.

It will be seen that in this way an effort is made, and a successful one, to combine a water gas plant with the retorts of a coal gas plant. Not only using soft coal in place of the more expensive coke, but also gaining the great advantage of saving the bitumen out of the soft coal, and allowing it to take the place of oil as an enricher of the water gas. The gas leaves the machine at a temperature of about 800°, and in order to save a portion of this heat, and at the same time cool the gas down to more manageable temperatures, it is passed through a large multitubular condenser with vertical flues surrounded with water. The water for the boilers is pumped directly through this condenser; in this way the gas is cooled and the water for the boilers is not only heated, but there is actually a great deal of steam made in this condenser and sent over to the boiler, against the boiler pressure.

After leaving the condenser the gas passes through a seal and washer, and thence through the scrubber, and next goes over into two small holders, which also serve the purpose of purifiers. These holders are 32 feet diameter and 31 feet high, although the lifts only rise 25 feet; the remaining height is used as a space in which a large purifying box is built. The gas is passed through both of these purifying boxes, and as the two holders together have a capacity of 40,000 cubic feet, the gas remains in contact with the purifying material nearly one hour. The purification has so far been entirely satisfactory; the gas mixing with the natural gas in any proportion necessary, and causing no complaints either from stopped burners or from any other cause.

The weather has been mild during the past winter, and we have not had occasion to run this plant more than 20 days altogether, so that it is impossible to give accurate figures as to the consumption of the various materials. As near, however, as I am able to arrive at it, it is about as follows for each 1,000 feet of gas: Gas coal, 35 lbs.; boiler coal, 13 lbs.; coke, 10 lbs.: oil, 2½ gallons. I am unable to give the candle power or the composition of this gas, but can say that it is a good quality of illuminating gas, and rich enough in heat units to allow it to be mixed with natural gas in almost any proportion.

The apparatus which I have described was erected by the National Heat and Power Company, of Philadelphia, Pa., and the essential parts of it are, I believe, covered by what are known as the Rose patents.

My paper has already grown longer than I intended to make it, and I have not yet indicated the arrangement under which the general use of gas as a fuel will most likely be prosperous. I believe that the best arrangement will be for the fuel gas to be furnished from the same works and through the same mains that the illuminating gas is furnished, and that it be as good, and, if possible, a better gas than is usually furnished for illumination. Let it be sold cheap and care be taken that it is burned in the most approved and most scientific manner, and that no time or money is wasted on silly experiments, which attempt to defy the laws of chemistry and natural philosophy. When these conditions are fulfilled, I predict that gas will become the fuel of the country to as large an extent as it has already been the light. If the old gas companies recognize and meet this new demand they will open for themselves a field broad, profitable and lasting. If, on the other hand, they entrench themselves behind their exclusive privileges, and are content to sell a small quantity of gas at a price high enough to pay dividends on watered stock, then they may rest assured that this demand will be supplied by new companies, which will in time become formidable rivals in the business of gas lighting.

Discussion.

The President—Gentlemen, you have heard a very interesting and valuable paper. I hope it will receive the discussion it merits.

Mr. Faben—It is an easy matter for me to open the ball by asking questions. I will have to begin at the rear end of the paper and go forward. I would like to ask Mr. McDonald how much tar he produces,

and if there are any carbon deposits, soot or lampblack, and some further details of the operation of the business.

Mr. McDonald—We made no lampblack. A black but very thin deposit accumulated on the still. It was less than 1 32d of an inch thick, and not much of it. I could not say what it is. As for tar, I have a half dozen places to catch it, but I have not found any.

Mr. Faben—Is it broken up in the process?

Mr. McDonald—As far as I know it is. Those more familiar with the gas business might have seen it, but I have not seen any. I hoped for some, but did not get any.

Mr. Faben—Did you find any ammonia products in the washing process?

Mr. McDonald—Yes, sir; we wash the gas and get ammonia water. But, as I did not attempt to separate the ammonia, I don't know how rich it is in that respect.

Mr. Faben—Another matter that comes to my mind is in the operation of a gas plant carrying on the dual business of lighting and fuel. Here is a company selling 100 per cent. of gas for lighting purposes, for which it receives, say, $1; and by incorporating a fuel gas company in its business, and selling at 40 cents, it is enabled to increase its business and sell another 100 per cent., which makes the average price received 70 cents per 1,000. I know that if any one of us started out here to urge the desirability of carrying on the dual business with two rates, we would be confronted by some person with the question, "If you sell that 200 per cent. of gas at an average rate of 70 cents, why make the cost for fuel purposes at such an exceedingly low rate, at the expense of those who use it for light?"

Mr. McDonald—My judgment is that it will have to be the same rate, and we will come to that gradually, but not at once. People won't pay twice as much for the same gas, coming out of the same pipe, for the two purposes. There is hardly a person present whose judgment on that would not be more valuable than mine. I know that if you get a lot of people depending upon gas for fuel, you can hardly supply what they will take. The demand is almost unlimited. I find on a cold day that the average call for gas on each meter we have set is 200 feet per hour.

A Member—How many stoves?

Mr. McDonald—We don't count the stoves. We set a meter, and they may use as they choose.

A Member—What is the average number of stoves?

Mr. McDonald—I cannot say as to that. There are large houses, with 15 rooms in them, and meters set for single offices.

A Member—Would it be as much as three?

Mr. McDonald—More. We have furnaces that will burn 120 feet per hour.

A Member—What has been your experience as to the amount of gas consumed by each fire?

Mr. McDonald—I would as soon give the average length of a piece of string. It will vary from 5 feet to 200 feet.

A Member—It is not so much the length of a piece of string as the average consumption of gas for fuel purposes that we are after.

Mr. McDonald—Well, the first year we began selling fuel gas we got an average income of $100 for each meter; the next year, $90; and the next year $80; the difference being made up in the economy of method of burning. The economy is going on, and I expect to see that economy increase every year.

Mr. Phillips—In your experience with this patent process you have installed, can you give us the cost of gas as made by this process in the holder?

Mr. McDonald—Well, I can come pretty close to it. It is about 18 cents or less.

Mr. Phillips—What would be the cost of distributing it? Could you make an estimate of that?

Mr. McDonald—I could, but would have to go to some memoranda to do it; I would not like to do it offhand. I should not think the total cost of distribution of gas for fuel, where distributed in large quantities, would be over 1 or 2 cents per 1,000 feet.

Mr. Phillips—Wouldn't the leakage be more than that?

Mr. McDonald—I do not include that on the cost of distribution, for that goes on anyhow, and there is as much of that on the 4th of July as on Christmas?

Mr. Phillips—The cost of the gas, you say, in the holder, would be about 18 cents?

Mr. McDonald—About that, I should say.

Mr. Phillips—And your estimated cost of distribution would be 2 cents; that would make 20 cents.

Mr. McDonald—It depends upon what you are charging up against it. If you charge the salaries of the officers and interest on the plant, etc., you can make these items higher. But in dealing with this problem I have figured on the principle that the furnishing of gas was to go on anyhow, and the only thing I need look at was that I got back enough money to cover the expenses to which I was put, and the only charge additional was on account of the material I had to use to furnish it. In other words, the ordinary operating expenses of the Company are not charged against it.

A Member—What pressure have you been furnishing natural gas?

Mr. McDonald—Eight inches.

A Member—What pressure have you been furnishing fuel gas?

Mr. McDonald—The same; I run them in the same pipe.

A Member—Have you been in the habit of furnishing natural gas through the holders also?

Mr. McDonald—I have never done tnat yet, but I intend to do it.

A Member—The regulators give 8 inches water pressure?

Mr. McDonald—Yes, sir.

Mr. Gwynn—What candle power was the gas you made?

Mr. McDonald—I don't know; I have no photometer, not having been educated in the business. But it is pretty near as good as that. (Indicating.)

Mr. Miller—This subject seems to have a very narrow application. Mr. McDonald's gas is like the old woman who made the cake for 15 cents, and everything was counted in but the seasoning and that cost 15 cents. One question I want to ask Mr. McDonald. Here is a room, 16x16x12, which he heated with a certain amount of gas. Now I would like to know something of how it was located and the temperature of the rooms around it.

Mr. McDonald—It was located on the first floor, in the L of the house, with the basement under it, two windows looking to the west, and one window and a door looking to the east, and a warm room on two sides. These two sides were out doors.

Mr. Miller—And a warm cellar?

Mr. McDonald—No; the cellar was vacant and not warm. I would say that room was a great deal more unfavorably situated than most rooms are.

Mr. Miller—Regarding the gas Mr. McDonald speaks of as being fixed gas. If the conditions are, as Mr. McDonald said, the gas leaves the apparatus at 800°?

Mr. McDonald—I had no pyrometer. I simply know that it turned iron a blue color at a red heat.

Mr. Miller—To fix oil gas you must raise it to a temperature that will heat iron to a bright red heat?

Mr. McDonald—The bricks in the superheater through which it passed were bright red.

Mr. Miller—That might be any temperature, but the temperature of the gas would depend upon the speed with which it went through.

Mr. McDonald—That is what I thought.

Mr. Miller—The oil must be heated to over 1,300° in order to fix it. I don't suppose Mr. McDonald had any condensation or much condensation in his pipes, because his natural gas is dry and therefore would have a great deal of room for any vapor that comes with the other gas.

Mr. McDonald—That is true after the gas leaves the works; but in the works it works under the same conditions as other gas. After the gas leaves the superheater it passes through a coil used for superheating steam, and it is very likely that coil lowers its temperature a great deal. The 800° there is very much of a guess. I would not swear within 400° either side of it.

Mr. Miller—Well, as regards that, the gas will not condense very much, unless it gets to be almost still.

Mr. McDonald—I have two holders full of gas that I made a month or two ago, and they were the same yesterday as they were then.

Mr. Miller—If you have no test of the candle power, how do you know?

Mr. McDonald—Well, from the appearance of the jet of gas. I keep it burning to see if it would stop up any.

Mr. Miller—Well, if Mr. McDonald can tell anything of candle power of gas by looking at it, I think he has more skill than most gentlemen in this room.

Mr. McDonald—I have denied that I have; but I can tell if any particular burner has deteriorated much since I last looked at it.

Mr. Miller—Unless it has been heated about 1,200° it can not be regarded as fixed.

Mr. McDonald—The only thing you have proved to me is that it is heated about 1,200° I am much obliged to you.

Mr. Faben—I would like to hear from some of the gentlemen who have had some experience in encouraging a more common use of gas

for fuel purposes. I know it would interest some who have not had experience. I have not. We are situated in the natural gas district, and they have all the fuel business that is there; but I think the paper suggests a very good thought and one that would be very interesting to members if the outline was made by certain companies. We learn through the members that a town, possibly Milwaukee, is making a special effort to introduce a more common use of gas for fuel, but that is about as far as we ever get. We do not learn how the industry is growing, what success it has the first year, nor what relation the second year bore to the first. There are other towns, smaller than Milwaukee, that have been doing a great deal in that line.

Mr. McDonald—If I had to take on a man to help out the fuel gas business, I would send him out to show the consumers how to burn the gas rather than to put him in the works. One man will have a gas bill of $65, and another one of $175. The difference is in the way they burn the gas. There is ignorance lying around in pools on the subject of burning gas among consumers.

Mr. Faben—Will you kindly give a little outline of your theory in building the stove that you described here? Your theory of combustion must be something different from the ordinary.

Mr. McDonald—I don't know that it is. You cannot possibly burn a gas containing carbon and hydrogen without getting carbonic acid and water. The carbonic acid is unhealthy and the water is disagreeable. If you attempt to give the stove a surplus amount of draft to carry off these products, you will carry off almost any percentage of the heat, sometimes as great as 75 or 80 per cent. On the other hand, if you use no flue at all, you make a room that is intolerable to live in. I built that stove on the theory of not allowing any air to enter, except that necessary for combustion, and that at the point where the flame originated. If I turn on more gas I turn on more air, so that the combustion is almost perfect judging by the appearance of the flame. As a test I have put a candle in to see if it would burn, and also to see if, by turning on more air, I could get more flame, and a point comes where a certain amount of exterior air gives you the best result; and while as far as I can see you will not get the same economy that you would with an open flame, you get an economy within 7 or 10 per cent. of it, and you will get a perfectly unobjectionable atmosphere in the room. I don't know whether I have made myself plain or not.

Mr. Faben—Do you interpose any solid material there to become heated?

Mr. McDonald—Yes, a sheet of asbestos wool. I do not think the combustion of gas is ever quite perfect, unless it meets a sufficient quantity of air to burn it, and is at the same time in the presence of some substance heated to a temperature capable of kindling a flame. I think both conditions are necessary to perfect combustion. On the other hand I think if gas is made to meet anything cool, like a vessel of water, that the combustion never will be perfect. You will always get an odor of ether in the room where it is burning.

The President—I might mention, as a matter of passing interest, in this connection, that last fall a gentleman came through Columbus with what he called a gas and air mixer. It was a device which mixed the gas and air together in exact and positive proportions, to effect as near perfect combustion as possible.

Mr. McDonald—That would explode.

The President—It did not in actual practice. He had his air and gas mixture, putting in 13 per cent. of gas and 87 per cent. of air exactly. There was no guesswork about it, and he burned it in a stove—not an ordinary gas stove, but a gas stove made more or less after the ordinary lines of gas stoves, and we made several experiments. We spent a day or two experimenting with the stove and his mixture, in comparison with the ordinary coal gas mixed with the ordinary mixer, and could evaporate much more water in a given length of time with his mixer, and do a greater amount of work with his device than with the ordinary device. It increased the efficiency of the gas, apparently, very much in actual practice. His theory was that the ordinary mixer was a rough-and-ready, haphazard arrangement, and that it does not introduce the air in proper proportions.

Mr. McDonald—You have not only to give the gas air at the mixer, but also to give it air at the moment when it emerges from the burner, otherwise it will either explode and light back in the mixer, or not burn completely when it comes from the mixer.

The President—Mr. McDonald, why do you put your purifier on the holder?

Mr. McDonald—Not on top, but inside.

The President—That is worse still.

Mr. McDonald—It is simply to save money on first cost.

The President—How do you get at that to replenish it?

Mr. McDonald—Fit it up with doors. The artificial gas makers will probably not realize that a plant only run for fuel can, whenever a warm wave comes, shut down for three or four days; but with two holders I can let down one and use the other, or let down both on a warm day, which is a different condition from that under which a man works who is furnishing gas for light.

The President—What price do you pay for coal, if it is a fair question?

Mr. McDonald—About $1.50 per ton.

On motion of Mr. Seaman a vote of thanks was extended to Mr. McDonald for his paper.

REPORT OF COMMITTEE ON PLACE OF MEETING.

The President—Is the Committee on Next Place of Meeting ready to report?

The Secretary read the following report:

COLUMBUS, O., March 22, 1894.

Mr. President and Gentlemen of the Ohio Gas Light Association: Your Committee on Location of the Next Annual Meeting of this Association respectfully recommend Springfield, O. Yours respectfully,

JEROME PENN,
GEO. H. TAYLER,
G. A. ALLEN,
} Committee.

On motion the report was received and adopted.

Mr. Cline—I desire to thank you for selecting Springfield as the next place of meeting, and assure you that we will very cordially welcome the Association.

THE QUESTION BOX.

The President—I think the time has arrived when we should take up the question box. The first question is—

"What effect has temperature of gas on deposits of naphthaline?"

As this question, to my knowledge, was asked by one of the best gas men of the State, so we must not consider that the question of naphthaline has been laid entirely on the shelf. I can say that for the last year we have been passing the gas through our purifying house and station meter into the holder at a temperature of about 100°, and have not had any naphthaline, at that temperature, at that point. Has anyone had any experience on this question?

Mr. Printz—I wish to ask a question. You say you have been passing your gas through the purifiers at a temperature of about 100°, and have not had any trouble with naphthaline. Now, before you increased to that, and were running through at the ordinary temperature of about 60°, did you have any trouble?

The President—No, sir; it has not had any effect upon it in that respect. If no one wants to speak further on that question we will pass to the second—

"Is it for the interest of the gas companies to sell and control the Welsbach light—a device said to burn but 3 feet of gas per hour?"

I think we all have views on this question, and I wish someone would say something.

The Secretary—That question was pretty well discussed yesterday, when I think it was shown that it was to the interest of gas companies, under certain conditions, to use that burner.

The President—I was going to ask if the object of this question was not rather that the companies should encourage some outsider to do it, leaving them in the background and disinterested in the matter. It may not mean that; it says "Sell and control." We will pass to the next question—

"What is the best method of preventing wrought iron service pipes from being destroyed by the single trolley system of electric railroads?"

I have here on the table a sample of gas service pipe brought over by Mr. Light, of Dayton, showing the effect of electrolysis in his town on service pipes.

Mr. Faben—Mr. President, the best method, it seems to me, would be to double the trolley.

The President—Gentlemen, I would ask the privilege of introducing to you at this point Mr. Kelly, the Superintendent of the Columbus Street Railway Company, who can tell us something on this subject.

Mr. Kelly—Mr. President and Members of the Association: I did not come here prepared to say anything, because I did not know that this question was to be asked. I want to say, however, that this is not a matter on which there is any antagonism between the two companies, because it is of vital interest that we should not have the current leaking through your pipes or the pipes of the water works company. I would say briefly that the best way is to weld the rail continuously.

That will undoubtedly prevent it. That experiment was tried last year in Cambridge, Mass., and they are so pleased with the prospect of obviating this difficulty that many miles of rail will be welded in St. Louis this year. I cannot agree with Mr. Faben about adopting the double trolley instead of the single trolley system, because that introduces complications we do not care to encounter. The difficulties we have met thus far are in trying to use the old horse car rails, which are loose on their chairs and have loose splice-bars, so that the bonds are frequently broken. This necessarily produces a high resistance, and as the current always takes the easiest path, it necessarily follows gas and water pipes. I think the matter is being very carefully considered by the street railway people. They are highly interested in it, and within a few years we will be able to give you relief; but that does not afford present relief, where the current returns to the station by the easiest route through your pipes.

Mr. Faben—I was not regarding the question from the street railway man's standpoint. If the rails were welded, and if it had a good path home along the rail, wouldn't that current still divide itself up and some of it go through the gas and water mains anyhow?

Mr. Kelly—I think that is so, if the rail were not of ample carrying capacity; but if it were, I think there would be no difficulty on that point.

Mr. Faben—You think the distance from the rail to the mains would be sufficient to insulate it?

Mr. Kelly—Let me mention an occurrence of last year, which was an expensive matter to us. Our feed wires were broken down and as far as possible we had to do without them. We ran our overhead or positive feed wire and cut off these feeders and attached them to the car wheels. We presumed the current would distribute itself through the earth and return to the station, because we were also grounded at the station. It seems, however, that the great majority of that current was passing through a 2-inch water pipe that enters the station. In that water pipe was a lead gasket, and the pipe was melted off. I was not in the city at that time, but my assistant was a good deal puzzled about it. The station was running all right, but the cars could not move. After a while they found there was a gap of not over 1-16th of an inch; there was not enough current returning through the ground to move the cars, but as soon as they ran a temporary feed line the cars began to move. The great proportion of the current was returned through these feed lines and not through the earth.

The President—Mr. Kelly, why is it that some gas companies and water departments, in some towns having an electric trolley system, suffer in this respect and others do not? Why are we exempt here from this difficulty?

Mr. Kelly—Well, I think that is due somewhat to the character of the soil. I know that is particularly the case in New England, where the soil is often saturated with salt water. There electrolysis takes place rapidly, and attacks gas and water pipes much faster than here. I think we have a very good return here to the station. We have four very good feed wires attached to the tracks at Spring and High streets, so we do not depend upon the ground.

Mr. Gwynn—A paper read before the National Association in Washington brought that question up, and it was attributed, to a great extent, to the heavy traffic on a great many roads. In a city where they have a light traffic they have less of it than where they have a heavy traffic.

Mr. Kelly—We are peculiarly situated as regards that. Our power station is about half a mile west of any of our tracks, and all the lines of the city converge on High street, so that the entire carrying capacity of all lines run through the wires of the High street line, so that all the current on our system being used at any time comes on to the wires on High street and returns to the station through these feed lines, together with what goes through the earth, and not through the mains. I have not heard of any current being carried through the mains in this system. Isn't that true, Mr. Butterworth?

The President—We have not experienced any trouble. The next question is:

"Are municipal lamps, 1,200 candle power, burning 3,250 hours per annum, at $35, remunerative?"

I am afraid that sufficient conditions have not been stated in this question to enable anyone to give an intelligent answer, though some may desire to speak upon it, and I will give them an opportunity.

Mr. Gwynn—A satisfactory answer cannot be given to this question unless the local circumstances are stated. Unless you have the prices of coal, the kind of lamps operated and the prices paid in salaries, and everything attached to it, I don't think any person could give an intelligent answer. The number of lamps in use, according to the output of the station, should be given also. It makes a great difference whether you are operating 20 lamps, or 100, or 500. These things all come in.

The President—The next question is:

"What is the gray (not black) deposit that forms on smoke bells, chimneys, etc., over gas burners?"

Mr. Phillips—Without answering the question, but stating circumstances that may lead to an answer, I will state that, in burning natural gas containing sulphureted hydrogen, where it is burned without a smoke bell, the entire ceiling will become covered with this gray deposit, and the paper hangers wipe it off or rub it off, and it is no doubt to be attributed to the sulphureted hydrogen in the gas. I have noticed this in natural gas, and have noticed that where the gas has been purer, as far as sulphureted hydrogen is concerned, that this dust is not as heavily deposited.

Mr. McIlhenny—I asked a gas man this question a few days go, and he said something very much like Mr. Phillips stated, that this whitish deposit, which nearly everyone knows will appear in a chimney that has not been cleaned for a long time—it seems to be a sort of crystalline deposit—in his opinion was due to the accumulation of a small amount of sulphur, or possibly something in combination with sulphur.

The President—We will pass to the seventh question:

"When oxide of iron purifying material refuses to revivify when removed from purifier, what is the cause and remedy?"

Mr. Hayward—Mr. President, this is a good chance to get my work in, I guess.

The President—This question was written for your benefit, I presume.

Mr. Hayward—I did not send the question in, I assure you. I should say it had better be thrown away. Laying joking aside, I should say, as to the cause, that I find by experience and investigation in the instance of many gas companies which adopted iron purification, the oily and tarry matters are not entirely taken out by the condensers and scrubbers, and pass through to the purifiers. Now, when lime is used, that don't make much difference, because when the lime becomes spent you can throw it away; but it is different with iron purification. Unless your condensers and scrubbers are efficient, and you remove your oil vapors and tar before they go to the purifying materials, they will clog and lodge there, and when the iron becomes coated with oil it is impossible to revivify or oxidize it a second time. It is very essential that the gas, before it comes in contact with the iron, should be screened, either by a layer of ashes, or sawdust, or spent lime, or something of that kind. Now, as to the remedy. The first one I gave of course you can accept, but another remedy that is efficient is to heat up the material. Heat it sufficiently so as to throw off the vapors, piling it up as high as you can in a cone shaped heap, and let the chemical action take place. You can increase this chemical action by sprinkling it with sulphate of iron, in strong solution, or mix some lime with it and heat it up thoroughly, and that will often help it.

The President—Mr. Hayward, will it be effective to heat it with a coil of steam pipe lying on the floor, and turning the steam through the coil?

Mr. Hayward—Yes, certainly; that will have a tendency to heat up the material, and that has a tendency to throw off these vapors, and the oxidizing effect goes on, of course. The chemical action which produces the heat comes from the very reaction that takes place. If you create an artificial heat and do not have any oxidation, the purifying material is not revivified. I don't think there is sufficient time given for the material to oxidize. It is put back into the boxes too quick. Then the disposition of the companies is to use too shallow a quantity in the boxes. It should be deep enough so that you can run it long enough that the extra box which is out may have a long time to revivify. The disposition is to be too economical with your purifying material.

The President—Question 8—

"What is the best way to oxidize iron borings for making purifying material?"

(Cries of Hayward.)

Mr. Hayward—Well, that is all right. That will give me a chance to say what the fellow did who wrote to *Punch*, or *Judy*, or *Puck*, or some of those comic papers, and asked advice about getting married. They said, "Don't do it." That is about what I would say about these iron borings. It takes a great deal of care and work to make oxide of iron and make good purifying material, and it seldom pays. You cannot use oak shavings. If you do, you get tannic acid. Your borings must not have oil in them, and must be of the right grade, neither too coarse nor too fine. It must be well oxidized. If there is any free metallic iron in it it is apt to go through the gas burner. Now, there is no buncombe about that.

The President—Question 9—

"Can anything be done to improve the market for retort carbon?"

Question 10—

"What is the best method of burning coke breeze under boilers?"

If there are no answers to that I will pass to the next one—

"Does not the use of street boxes entail a large expense without compensating advantages?"

I think that is a nice question and an important one.

Mr. Seaman—In answer I would like to say the only objection to street boxes is the expense. We might say that for food and clothing also; but they are necessities and we must have them, and I think that street boxes are essential to every gas plant. I believe stopcock boxes are worth more than they cost, and especially in large cities where the streets are paved, for the following three reasons. First: In case of fire the gas can be cut off without tearing up the street. If you will take the time to inquire into it you will find what a bad thing it is to have a service pipe discharging gas into a burning building. Second: It enables a man to make connections with the meter without filling the cellar full of gas and thereby prevents explosions. Some companies suffer severely from damage suits due to the absence of a stopcock. Third: It enables the company to shut off the gas in the street, and the stealing of gas is better prevented. As long as the meter is in the house the agent of the gas company has a right to enter the premises, but after the meter is taken out this right does not exist and entry can be prevented by the owner or occupant. Without a service cock then it is an easy matter for the occupant to make a connection without detection, and it is seldom that a house is entered by an employee of the gas company when there is no meter in it. It is a good thing to keep people from the temptation to steal gas and to be able to control your own business, and this cannot be done without stopcocks on the service pipes. I will state, too, that I am no agent for the supply house.

The President—Has anybody anything to say on the other side of the question?

Mr. Coombs—At our place we have never had any use for service boxes and never put them in. I don't suppose we have been called on to shut off two services in 25 years. Of course that only affects probably our own place, but we don't think much of them and don't put them in.

Mr. Boyle—I would like to ask Mr. Coombs how he locates his service pipe if he wants to take it up?

Mr. Coombs—You have to locate them from the building—follow them up.

Mr. Gwynn—I think the little cost incurred in putting in service boxes and stopcocks is but a trifling matter compared with the matter of making connections. They only cost about a dollar, and I think for the safety and good effect in case of accident in the building, it is best for the company to put them in. I think it is a good plan to continue putting them in, even if they do get out of order. You have done all you can, and no responsibility will attach to the company by reason of its failure to do so.

The Secretary—How many of the stopcock boxes are ready for use, Mr. Gwynn, at any time you go to them, and how many of the boxes that have have been in five or six years can be found except by long hunting?

Mr. Gwynn—I think there is no trouble if you put in a good extension box. I don't think there is any trouble in finding them. We have them in six or seven years, and there is no trouble in finding them and turning them off. Of course, in time they get out of order; but where they are put on the sidewalk there is no reason for their getting broken or dirt getting over them, if you will pay a little attention to them.

A Member—Suppose the city comes along and lays a pavement over the top of them.

Mr. Gwynn—If the gas company were paying attention to its business it would raise them and put them on the right grade.

Mr. Coombs—That might be true if the gas company was notified; but they change the curb and grade without notifying you, and they are lost.

Mr. Gwynn—I don't think in a city of this size many grades are being changed without the company knowing it. Your men are out over the city all the time and notice these things. Occasionally one may get covered up, but the percentage will be small.

Mr. Seaman—I think it is the Superintendent's business to attend to his own business, and not rely upon his neighbors for things that demand his attention.

The President—I think Mr. Gwynn underestimates the cost of these stopcock boxes, which I think is more than $1. We estimate them at about $2 apiece instead of $1, and in Columbus we think we are paying about $1,800 interest on an investment in stopcock boxes at the curbstone, and I question if we get a compensating advantage. While talking to Mr. Addicks yesterday he told me, I think, that they have no stopcock boxes in Boston, but they have valves so that they can cut off the gas from the whole street in case of fire. I have a theory that these stopcock boxes can be dispensed with at the curbstone with safety and economy in the residence portion of the city; but probably in the business portion of the city they should be used.

Mr. Gwynn—Let me understand you. Do you say stopcock boxes cost you $2 on an average?

The President—I think probably they do, on the average.

Mr. Gwynn—Boxes and stopcocks?

The President—Yes, sir; and the labor of setting.

Mr. Gwynn—Well, the labor is hardly worth mentioning. An ordinary 3 foot box (you don't use over that) costs from 95 cents to $1, and the ordinary stopcock don't run into much money. I should not think the average cost would be over $1.60 or $1.70. The labor is very trifling. You have to dig the ditch anyhow. It is only the trouble of setting up the boxes while the dirt is tamped around them.

The President—Well, our Company has probably as many stopcocks out in position and not used as in actual use, and if you multiply your consumers by two you have probably the number of stopcock boxes set. The aggregate cost is very considerable, and it is a question with me whether the companies are warranted in putting them in.

Mr. Penn—In the last year or so I have put in a number at an average cost of over $2. I do not use them on small services. Most of those I put in are 2 inches, 1½ inch and 1¼ inch. In our town we have had our streets paved, and, of course, as I wanted to put in service pipes that will last a good while I put in large ones. In the residence parts of the town I do not see any use of it. So far as stealing gas is concerned, they are all honest. A lawyer who tried to steal gas once was the only one I ever had to try to steal gas, and he excused himself.

Mr. Seaman—While this question is up I would like to ask what is the smallest service pipe that any of you have put in?

Mr. Coombs—In Youngstown I believe the smallest runs down to 1 inch. We used to put in ¾ inch, but we stopped that.

The President—I think very few companies put in less than 1 inch now.

Mr. Cline—I would like to ask Mr. Gwynn if he thinks he has saved enough by the use of the boxes to pay the expense incurred in putting them in.

Mr. Gwynn—That is a question that would be hard for me to answer, because we have had but a few occasions to use them. One fire there last fall burned out half a square, and we were not able to get into the buildings to shut the gas off, and the only way we could shut it off was at the stopcock. That is the only instance that I remember of our having occasion to use them. I was in an accident about 15 years ago, in a cellar where it was very close, and in undertaking to couple without a stopcock box we got too much gas in the cellar, and a man who raised a light caused an explosion. I never forgot that.

The President—If there are no further remarks on this matter, we will proceed with the consideration of the 12th question—

"Is it advisable to require deposits for security of bills, excepting in extraordinary cases?"

Mr. Gwynn—I think the President might answer that question.

The President—I will shift the responsibility and ask our Secretary to answer it.

The Secretary—I don't see why a gas company should not use judgment on that question as in any other business. If a man is deserving of credit, and will pay his bills, I don't see why he should not be trusted; and if you think he is not, I don't see why he should be trusted. It is just like any other business.

The President—I think, in view of the increasing competition that gas companies are meeting with, that this question is thought about more than it otherwise would be, and probably the lines are not drawn near so rigidly as they used to be regarding deposits. Gas companies, I think, will run risks now which they formerly did not take, and although a man may default on the last bill in the year, they feel that they are still ahead. I think the companies in the future will not be as rigid in the matter of deposits as heretofore.

Mr. Gwynn—When a stranger comes into the office, who is not a property owner, we require a deposit, and later on, when we find he pays his bills promptly, we often release him.

The Secretary—Do you pay interest on your deposits?

Mr. Gwynn—We do on the larger ones. If the deposit is above $5 we pay 6 per cent. interest.

The President—Question 13—

"What advantage has gas light over other forms of artificial light?"

Mr. Shelton—I should simply say, Mr. President, that I think gas is the cheapest means of illumination, embodying all the conveniences for the modern customs of man, especially in the ability to regulate it, and being free from the objectionable features of other forms of light, as in the case of kerosene oil and carbon. I should say economy, coupled with convenience, is the distinguishing characteristic.

Mr. Gwynn—And reliability.

Mr. Shelton—Decidedly.

The President—Probably, also, it is accompanied with less danger from fire and explosions than oil lighting—another thing in its favor, I suppose.

Mr. McIlhenny—One thing in connection with gas compared with incandescent lamps that results favorably, it seems to me, for the gas, is that the carbon filament in the incandescent lamp is constantly shaking. This is almost imperceptible where two or three of them are lighted, but if there is only one, and the shadow of a stronger light, as the light of the sun, is thrown against it, you can see the rapid movement of the filament. That is trying to the eyes. We frequently hear complaints from people who read by incandescent lamps, as to the bad effect the light has upon the eyes. Of course the gas does not vibrate very much.

Mr. Miller—I don't think the point of turning the flame up and down has been touched on yet.

Mr. McIlhenny—I might mention that while staying at a Chicago hotel last summer a very well dressed man came to the desk and inquired their terms for rooms. They stated the terms, which seemed to be satisfactory, and a very good price they asked him, too. He asked, "Do you use gas or electric light in the hotel?" The clerk said, with a great deal of pride, "We have our entire establishment fitted up with the incandescent light." "Then," the gentleman said, "I won't come here. I am tired of having one miserable light in one corner of the room and the bureau at the other. I can't dress properly, and I am only going to stay where they have gas." I spoke to him afterward, and he said he had no connection with any gas or electric light company, but that he had derived his views on the subject from his experience in traveling and stopping at hotels.

Dr. Jones—In regard to the advantage that one light has over another, it has often occurred to me that gas is a superior flame to almost any of the other illuminants, except perhaps coal oil, on account of the greater diffusion which the light has. But when it comes to the steadiness of the light, I think the gentleman who has spoken is in error. Having used both the incandescent lamp and gas light at my desk for years, the steadiness, I think, is largely in favor of the incandescent lamp. The pulsations are not due to the jarring of the filament, but the irregularity in the engines' stroke, which produces irregularities in the voltage of the current. But the objection to the incandescent light is the same as that to the Welsbach burner. It is an entirely different grade of light, and emanating from a fine filament, intensely bright, it is very trying to the eye, if you get a glance at the filament itself. Therefore, the filament should be entirely covered either with an etched globe or an opal shade, or some arrangement of that kind. Otherwise it is very trying to the eye. Next to a good gas jet in an argand burner, I suppose, comes the coal oil lamp. Of course an argand burner is better than an open gas jet, because it is much steadier. We have heard complaints about the advantages and disadvantages of all kinds of light upon the eyesight, but I think the evidence of the medical profession today is in favor of a good coal oil burner, like the Rochester lamp, or which is very much the same thing, an argand burner; and that, as far as my information goes, I think has been decided to be the most pleasing form of light and the most acceptable to the human eye. A bare incandescent light is so very trying to the eye that in some of the cities of the old country it is now hardly used at all.

The President—If there is nothing further on this question we will read the next one—

"What is the best method of tarring service pipe?"

Mr. Faben—We tar our service pipe by connecting it with a steam line under pressure, plugging the end of the pipe, and having the pipe under boiler pressure, 45, 50 or 60 pounds, and, while the pipe is hot, paint it with tar which has been previously heated and kept hot. We then shut off the steam, unscrew the pipe, and by the time it cools it is perfectly dry.

The President—How do you keep that tar hot?

Mr. Faben—In a tar bucket with a little fire under it. It also has the effect of testing the pipe before it is tarred.

Mr. Coombs—I wish to ask Mr. Faben if he paints the pipe with a brush or dips it?

Mr. Faben—We paint with a brush.

Mr. Anson—I would like to ask Mr. Faben how long it takes to paint a car load of pipe in that way?

Mr. Faben—Well, that I could not say. I don't know that we ever started out to paint a car load at one time. We never run completely out of pipe, and the pipes, when painted, are deposited at one point and the stock replenished as fast as used. A man generally paints this pipe when the weather is bad or we have no better job to put him at. Of course there is cost attached to it.

Mr. Anson—My question was whether you tarred it as you used it or painted it all at one time. We have a long tub constructed of wood, and have a coil of steam pipe passing through the bottom, which rests on rollers; we turn the steam into the pipe and that heats the tar, and we tar our pipe by the car load, and store it.

Mr. Faben—The reason I adopted the steam was I used to employ an open fire for heating the pipe and found that the pipe heated very unevenly, when, if you dipped that pipe then into tar or painted it as we did, the tar would get burned and would peel off. In using the steam to heat the tar it don't get so hot that it will burn, and the tar won't strip off with the tongs, as it would do if it was heated too highly.

Mr. Anson—Do you use any oil in the tar?

Mr. Faben—None whatever. We used to use coal tar, coal oil and resin in the proportion of two gallons of tar, half a gallon of crude oil and half a pound of resin. Now we just boil the tar and it gives us a better result than any compound.

The President—The next question is—

"What is the comparative value of black and galvanized pipe for gas service?"

Has any one any experience or information on this question?

Mr. Shelton—Can Mr. Butterworth give us the cost of the tarred pipe as compared with galvanized pipe?

The President—No, sir; and even if I could it would hardly answer this question. It wants to know the comparative value of the two. Is there any gas man here who uses galvanized iron pipe for service work? Mr. Welch, have you any information on this question which you would like to present?

Mr. Welch—No, sir; I never used any of it.

The President—Do you contemplate using it?

Mr. Welch—Yes, sir; I do. The price of pipe now is quite low.

The President—I find some other questions in the Question Box, and one is—

"What is the best plan of enriching in a small coal gas works?"

Mr. Faux—I know of no better plan than naphtha.

The President—Even in a very small works I would say that I don't know of anything that is cheaper or more easily handled. What grade would you use?

Mr. Faux—About 62° to 65°.

The President—How much more expensive is 65° naphtha than 58°?

Mr. Faux—I don' think it is any—not to my knowledge, anyhow.

Mr. McIlhenny—I don't want to say too much, but in a small gas works, in which I am interested, we have made some experiments on this question, which may possibly be of advantage or use to some of the members of this Association. The works are too small to entirely devote a retort to running in naphtha in the way in which it is ordinarily done, so recourse must be had to some other and simpler means of using it. This we do by simply taking a 2 or 3-inch pipe and plugging one end up, with a wooden cap in the other, and throwing that, filled with oil, on top of the coal. We are now using a plan which works very nicely, which is of very great advantage in a small coal gas works. Using only one bench of 5's, one retort cannot be devoted to the use of oil exclusively, and recourse is had to the following method and which works very nicely. We inject the oil upon the hot coke during the last hour of the charge, employing a syringe for the purpose. This syringe is made to hold a quart of oil and is provided with a nose, the outside of which is threaded to fit a ¼ inch cock fastened to a hole tapped in the mouthpiece of a lid; the inner part of the nose is threaded ¼ inch, and into this we insert a piece of ¼-inch pipe, 2 feet long, and with the tip drawn to a small hole to reduce the stream of oil to a small spray. In operating, the syringe is filled from a can holding a gallon of oil, the cock opened on the outside of the lid, the small ¼-inch pipe inserted and run through the nose of the syringe and screwed into the cock by a few turns. The plunger of the syringe is then slowly pushed "home," squirting the oil upon the hot coke, reaching the back of the retort. The syringe is then allowed to stay in position for several minutes until all

the oil is gasified and disappears. By so doing the heat of the bench does not appear to be affected and several injections can be made if necessary during the hour. The advantage of this method over the cartridge system is that the oil does not go off when the heat is lowest, at the beginning of the charge, and is hence less liable to be stopped in the hydraulic main. The oil injected upon the hot coke is made into genuine oil gas and does not appear to form lampblack as might be imagined. Also, more oil can be thus used than is ordinarily contained in a cartridge. By having two lids tapped and using two syringes a good deal of gas can be so made. As the oil is handled a good deal, to avoid danger a good fire test oil has been used instead of naphtha. A small force pump working from a barrel of oil could also be used in this way with the aid of a short length of hose. The method is simple and may be of advantage in a small works where it is desired to increase the candle power of the gas or where an inferior coal has to be used, or when cannel coal cannot be advantageously obtained or used.

Mr. Shelton—Does this subcutaneous or hypodermic injection work all right in use? It appears to be something new in that direction.

Mr. McIlhenny—It has worked so far satisfactorily, and has given us no trouble. It, of course, is advisable only in a small works, as other methods may be employed in a larger works. We found this increased the candle power of the gas very much, and it works very nicely. No lampblack seems to be formed, to amount to anything, and we certainly get a better gas by this means, and are enabled consequently to use a lower grade of coal.

Mr. Shelton—How often does the man give the retort that sort of an injection?

Mr. McIlhenny—Well, say, every charge; every four hours.

Mr. Shelton—Does he turn it in at one time?

Mr. McIlhenny — No, gradually. It is fixed so that it will squirt water about 18 feet, and it goes in in a kind of a fine spray.

Mr. Shelton—My point was that the man would try to dodge having to go there very often, and would consequently put it all in at once, and have a bad effect on the heat.

Mr. McIlhenny—We use this four times in an hour, and let the charge stay in a little over 10 minutes, after all the oil has been thrown in, so that it is entirely turned into gas, and escapes, and it works very nicely.

The President—Here is another question that came from the question box—

> "When the pressure in a main is 2 inches, just before a descent of 150 feet to cross a ravine, and the pressure is ½ inch at the bottom, what is the pressure at the top of the ascent on the other side of the ravine, friction not being considered?"

He submits a sketch here.

Mr. Shelton—I don't see why it should be different from the ordinary practice. If you have a half inch at the bottom and rise 150 feet on the other side, you get an increase of pressure in that rise of 150 feet, of course, but if there is nothing to be taken into account for friction, you would get the same pressure at both edges of the ravine.

The President—That ends the regular business. Is there any further business to be brought before the meeting? Is there any unfinished business or new business? If not, a motion to adjourn is in order.

Mr. McIlhenny—Before adjourning, I move that a vote of thanks be tendered to the officers of this meeting for the manner in which they have conducted it for our comfort. (Adopted.)

On motion, the convention adjourned.

The Clayton Coal Tar Pump.

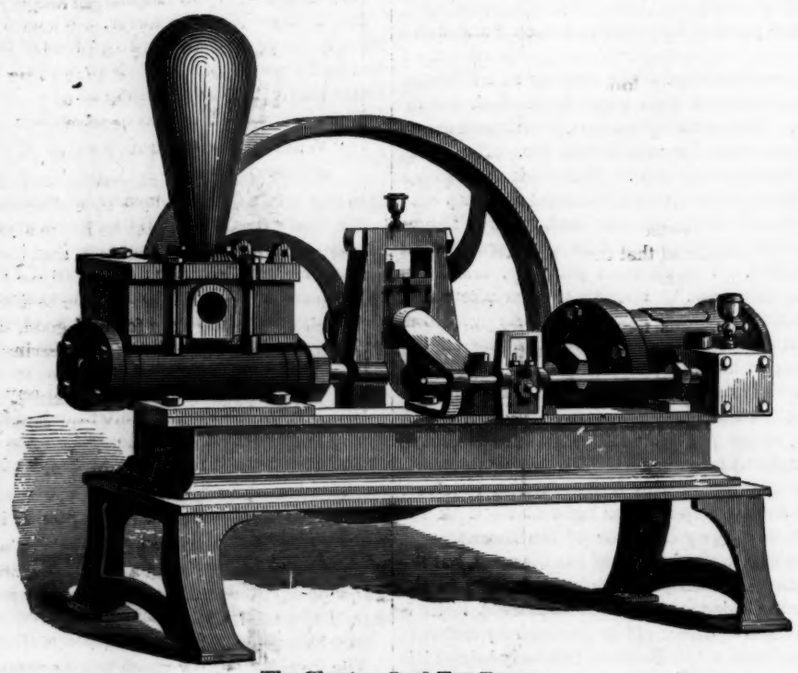
This pump is a modification, designed especially for pumping coal tar, of the Clayton flywheel steam pump, long and favorably known to the trade.

Its chief merits are its extreme simplicity, strength and durability, and, for handling a thick, heavy, slow moving substance like coal tar, its valve arrangement is peculiarly adapted. The valve seats are placed in a slanting position, at an angle of about 45° and the valves have only one large opening through them, reducing the liability of choking to a minimum.

It is equipped with extra heavy flywheel, extra large air chamber, iron piston and rings, and composition valves and seats, with steam pipes connected to tar cylinder for softening the tar when necessary.

This pump is built in many sizes by the Clayton Air Compressor Works (Havemeyer Building, New York), well known as constructors of air compressing and pumping machinery.

In a list of published testimonials from the users of these tar pumps, we quote from the Mica Roofing Company, who say they "have tried several makes, but find the Clayton superior in every respect." The Philadelphia gas works "have one running day and night with perperfect satisfaction," and Messrs. M. Ehret, Jr., & Co., Philadelphia, who "have several of them in constant use, running economically and costing nothing for repairs." The New York Coal Tar Chemical Company, the S. E. Barret Manufacturing Company, and the H. W. Johns Manufacturing Company are also among those who recommend this pump as combining so many features specifically desirable in coal tar pumping.



The Clayton Coal Tar Pump.

The Briquette Factories at Blanzy, France.

According to M. de Dinechin, the Blanzy Company was the first in France to make briquettes, their works commencing operations in 1845. The original plant consisted of hydraulic presses by which only one briquette was made at a time. Tar was used as the agglutinant, and the product had to be passed through drying stoves for the purpose of giving it consistency. New methods of mixing and increased facilities for large production rendered new machinery necessary. The present plant consists of two factories, Nos. 2 and 3, one having three Revollier presses and the other four Bietrix presses.

At Factory No. 2, where the Revollier presses are at work, the method of manufacture is as follows: The coal dust, containing 14 to 15 per cent. of water, is taken in wagons from the draining tanks of the washing house and tipped into a pit, from which it is raised by buckets to a hopper in the upper part of the works. From another pit dry pitch, broken by a Carr disintegrator, is raised in buckets to the same hopper. The buckets are so arranged as to deliver 9 per cent. pitch to 91 per cent. coal. After being mixed by passing through endless screws, the coal and pitch is "pugged" for 8 to 10 minutes in a pug mill. The mill is jacketed with superheated steam. The mixture then falls into the molds and is compressed by means of hydraulic rams, averaging from 142 to 156 pounds per square inch. This lasts about half a minute, and leaves only 4 per cent. of water in the briquette. After compression, the patent fuel is left on a haulage chain for 40 minutes, when it is ready for loading. The three machines produce 240 tons daily.

The Bietrix presses at Factory No. 3 work more rapidly than those just described. This rapidity of production requires that the coal be dried to remove the large quantity of water contained before being

pressed. The coal and pitch are mixed in proportions as before, and carried by endless screws into a reverberatory furnace having a revolving sole. The mixture, after turning around from 8 to 16 seconds, is taken by an inclined creeper to the pug mill. It now contains from 6 to 8 per cent. of water, which is further reduced by the press, the pressure being 2,300 pounds per square inch. Each press makes 22 to 23 briquettes per minute, or an aggregate for the four of 330 to 340 tons daily. An auxiliary press attached to No. 4 in Factory No. 3 makes round or "cannon ball" briquettes. The total production at Blanzy is 550 tons per day.

Working a Leaky Telegraph Line.

In a mathematical paper, read before the British Institution of Electrical Engineers on March 29 by Prof. W. E. Ayrton and Mr. C. S. Whitehead, there was discussed the question of the best resistance for the receiving instrument on a leaky telegraph line. The discussion of the subject started from the accepted condition that if there be a single earth fault at any one point of an otherwise good telegraph line, the best resistance to give to the receiving instrument is equal to the apparent resistance of the line tested from that end, when put to earth at the other end through a resistance equal to that of the signalling battery at that end. The authors then considered whether the above result was universally true for a distributed leak all along the line, or only for a single earth fault; and, if the solution were not generally true, then what was the best resistance to give to the receiving instrument at the end of a telegraph line the leakage along which followed any law. The conclusion the authors arrived at was, whatever be the nature of a leak on a telegraph line—whether the leak be a single one, or be distributed along the line according to any law of distribution—the same rule holds true for the best resistance to give the receiving instrument, viz., the receiving instrument at either end should have a resistance equal to the apparent resistance of the line when tested from that end and put direct to earth at the other end. It is assumed that the resistance of a coil of wire occupying a given form and volume is proportional to the square of the number of convolutions. This is absolutely true either when the thickness of the insulating covering is negligible compared with the thickness of the copper, or when the ratio of thickness of the insulating coating to the diameter of the copper is constant for each gauge of wire employed. In a paper on galvanometers, published in the Proceedings of the Physical Society, examples are given of similar coils of silk-covered wire of very different resistances where this proportionality of resistance to the square of the number of windings holds very well. In some other cases, however, as will be seen by referring to that paper, the resistance is more nearly proportional to the number of windings raised to the power of five halves. It is, therefore, worth while considering how the rule given above for the test resistance for the receiving instrument would be varied if the coil of the receiving instrument were wound with such insulated covering wire that M, the magnetic effect, instead of being proportional to A $\sqrt{q}$, were proportional to A q^n, q being the resistance of the receiving instrument at the receiving end of the line, and A the current flowing through it. In that case it may be shown that M will be a maximum when q is $\frac{n}{1-n}$ times the apparent resistance of the line when tested from the receiving end and put direct to earth at the signalling end.

A New Aluminum Solder.

One of the most perplexing questions encountered in the development of the uses of aluminum has been that of soldering the metal. In many instances the effort has been made to get around the difficulty by riveting, a method frequently awkward and often leading to structural weakness. An opportunity was offered recently to a representative of the *Iron Age* to witness a series of tests of a solder which is being introduced by the Alsite Aluminum Company, 106 and 108 Liberty street, New York. Among the tests made were butt welds of sheets and plates, which under tension showed the soldered joint to be so well made that rupture took place in every instance outside of the joint. Strips connected by butt soldering were twisted in the vise without opening the seam, and soldered tubing has been successfully drawn recently. The surfaces to be soldered are cleaned by dipping in a hot solution of soda or potash, then dipped into nitric acid, rinsed in hot water and dried. Sometimes the surfaces are cleaned by filing the edges to be joined. The parts to be soldered are heated as hot as can safely be done without melting, and a small portion of the solder is spread over the edges by means of a soldering brush, which should be kept heated during the process. The edges are then joined and more solder is applied and spread evenly over with the brush. During the entire operation the metal is kept as hot as possible, and it is completed when the solder becomes distinctly white or the aluminum assumes a reddish hue. Authorities on the working of aluminum have acknowledged that soldering by the Alsite process accomplishes results not hitherto attained.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. John Allan, editor and proprietor of the *Gas World*, London, England, died on the morning of the 6th inst.

Mr. Ralph Woodward, formerly in charge of the American Gas Company's plant at Peru, Ind., has been appointed Superintendent of the American Company's plant at New Rochelle, N. Y., and Mr. A. J. Reinbold, who was in charge at New Rochelle, goes to the American Company's property at Elgin, Ills., to fill the position made vacant there by the resignation of Mr. R. F. Fitz.

Mr. Charles V. Newman has been appointed by the Peoria (Ills.) Gas Light and Coke Company to take charge of its distributing and gas stove department. The Company will make a vigorous effort this season to put out a number of gas ranges, the greatest incentive, of course, being the Company's announcement made some time ago, that gas for fuel purposes is hereafter to be sold at the rate of 75 cents per 1,000. One of Mr. Newman's first advertising moves was to give wide publicity to the fact that each purchaser of a gas range, such purchase to be made prior to June 1st, would receive a solid silver spoon, in the shape of a souvenir.

For the following interesting budget from the West, we are indebted to "A.," whose notes bear date of the 12th inst.: "Mr. Elwood, of Joliet, Ills., is rejoicing that he has just been relieved of the duties attendant upon the Supervisorship of that town, wherefore he will be enabled to give all his time to the gas business.——I have witnessed many funny scenes in gas offices since I have been travelling among gas companies, which usually take the form of good, hard 'kicks.' Just as I am writing a middle aged, matronly-appearing woman is at the desk to pay a gas bill, and has just said, 'I really can't see how our bill is so large for the little amount we burn. I really believe we shall have to give up housekeeping if they don't get smaller. Did you receipt the bill? Thanks.' This, of course, was a mild 'kick' to what they usually are. The hardest kicker I ever heard was a man whose bill was 75 cents for the month of November, and Will. Rand, of Minneapolis, declared the man would kick if he was going to be hung. The strangest experience I ever knew of a gas man having been through fell to the lot of Harry Walbridge, of Grand Rapids, Mich. Your correspondent was in his office recently discussing gas matters, when Joe Rosenthal, a giant in stature and a clothing dealer by occupation, entered, and, in a gruff voice, said to Harry: 'Do you correct errors your collectors make; or do they correct their own errors?' Harry answered, his prettiest smile lighting his face: 'If any error has been made we will correct it, of course.' Then the countenance of Joe changed from sternness to a smile, and he said: 'My cash was 70 cents over last night, and as that was the amount I paid your collector for this gas bill, and as I found the 70 cents on my desk after he had gone out, I thought I would bring it to him.' I don't suppose Harry has recovered yet. Surely the writer never heard of an instance of this kind before, and Joe R's. only excuse was that 'the collector appeared like a decent cuss, and might not be well able to lose the 70 cents.' Joe Rosenthals do not grow on every bush.——I have not seen a man in a month who has not said: 'Yes; I am going to Cleveland in May.' Look out for a big meeting there. It almost seems as though the majority of people would rather go to a town of that size than a larger town to attend a convention.——It seems to me that the majority of manufacturers underestimate the value of a good exhibit at conventions. In the Ohio towns in which exhibits have been held the Managers of the Gas Companies tell me that they have sold from 300 to 500 stoves because of the exhibit.——Mr. Wilkie, the inventor of a gas kiln for firing crockery, promises a fine exhibit of kilns and artistic work at Cleveland. The ladies will be interested in this."

The following letter, bearing the signature of Mr. William A. Aldrich, of this city, was forwarded under date of April 11th:

To the Editor of the American Gas Light Journal: At the annual meeting of the Ohio Gas Light Association, held at Columbus, Ohio, March 21st and 22d, Mr. Anson read a paper on Testing Gas Meters, on which I beg to offer a word of comment. I suppose no one was more

agreeably surprised than Mr. McIlhenny to hear that of 5,000 meters tested not more than one-fifth of one per cent. was out, and that against the Company. Now, sir, I wish to ask a question, which I am surprised was not asked of Mr. Anson by one of his hearers, and until it is answered, I, as a practical gas man, cannot accept the conclusions arrived at by Mr. Anson. It has been my experience that of every hundred old meters tested under proper conditions, 66 per cent. were found fast. I want to say right here, that no instrument in general use acts so faithfully as a gas meter, but that they deviate only one-fifth of one per cent., notwithstanding the rough treatment they are subjected to, requires a quantity of *cum granum salis*. I do not wish to be understood I am doubting that Mr. Anson did obtain such results as those contained in the paper read; but what I wish to ask is: Were the meters tested with gas or air, and were all other conditions of a careful examination present? I accept the results if air was passed through the meters, which, in consequence of its increased density, passes with less speed through the meter. This being so, the difference between the specific gravity of air and gas, .033, should be added. Mr. Somerville was right in his correction. The English law discriminates against the Company 1 per cent. simply because it was decided, after most searching tests by such men as Dr. Letheby and others, that 33 per cent. of the meters tested warranted it; hence the statute law of 2 per cent. fast and 3 per cent. slow. Too little importance is placed by gas companies on the question of testing meters. I remember a case where a certain Company agreed to test a meter for a "kicking" consumer. It was a cold January morning, and the testing room was bitterly cold. The tank of the holder was full of ice-cold water. The meter prover obtained a pail of hot water and placed most of it in the tank. He then put the thermometer in and it showed 60°. He proceeded to test the meter at once, and on my venturing to suggest that the water a little lower than he had placed the thermometer would be very cold, he gave me a pitying look and said, "I guess it'll do." I would like to say something on the question of periodical changing and testing of meters and the commercial advantage thereof to gas companies, but I am afraid I have trespassed too much already on your valuable space.

THE McNeal Pipe and Foundry Company, of Burlington, N. J., has placed the contract for two cleaning sheds with the Berlin Iron Bridge Company, of East Berlin, Conn.

THE itinerant meter inspector is making trouble for the Laclede Gas Light Company, of St. Louis, several of these vagrants being engaged in attempts to have the gas consumers order a test of their meters made. The revised city ordinances (section 799 of chapter 19) of 1893, respecting the testing of gas meters on the complaints of gas consumers, are as follows: "It shall be the duty of the Supervisor of City Lighting, upon the written request of any gas consumer to have the meter supplying him with gas tested, to call at the residence or place of business of the consumer, and disconnect the meter from the service pipe of the Gas Company supplying gas through the said meter and bring the same to the place for testing meters, and the said Supervisor shall thereupon prove and test the meter to ascertain its accuracy; and in the event of the meter proving accurate within the meaning of this chapter, the consumer is required to pay to the inspector the sum of $1 for such inspection. The Supervisor shall give a receipt therefor, countersigned by the City Register, and pay such collections every Saturday of each week into the City Treasury. And if the meter prove incorrect, the consumer is to be at no expense for said testing, and the inspector is thereupon required to immediately notify the Gas Company of the inspection in writing, stating the percentage of inaccuracy and order the placing of a correct meter in place of the one proving incorrect, and any refusal or neglect to do so within 24 hours after receiving due notice shall be deemed a misdemeanor, and upon conviction said Company shall be fined $10."

MR. ARTHUR L. HAYDEN has resigned his position with the Citizens Gas Light Company, of Willimantic, Conn.

MR. WILLIAM Y. SCOTT, who had been in the service of the Meriden (Conn.) Gas Light Company for many years, died at his home in Meriden on the evening of the 8th inst.

SOME time ago we reported the sale of the Doylestown (Pa.) gas works to Philadelphia parties, and the original owners subsequently denied that the sale was made. In order to determine the matter we wrote to Doylestown, and in reply received the following: "The sale of the Doylestown gas works, reported some days ago, is confirmed by the receipt for record of articles of agreement for the sale by Recorder Croumel. The articles are dated April 6th, and are between James Kane, of Doylestown, and Frank D. Zell, of Philadelphia. The property includes the real estate at the gas works and the pipes in the streets, with the franchises, etc. In fact, it comprehends the entire gas plant. The consideration is stated at $3,050, the plant being subject to a mortgage of $12,050, which makes the price practically $15,100, and for this sum the seller agrees to make good title, etc. The terms of the payment set forth are $100 at the time of signing the agreement, and $2,950 at the time of passing the title. Transfer and settlement are to be made within three weeks from April 6th. The agreement is signed and sealed by Messrs. Kane and Zell and duly witnessed and acknowledged. Appended to the bottom is a receipt for $100, signed on April 6th by James Kane."

MR. H. S. HOLT has been elected President of the Montreal Gas Company, vice Mr. Jesse Joseph; and Mr. Hugh McLennan was elected Vice-President.

DR. DORPDALE, of Philadelphia, has placed the contract for an iron roof over the new power house for the Hospital for the Insane, at Norristown, Pa., with the Berlin Iron Bridge Company, of East Berlin, Conn. It was desired that the roof be fireproof, and ordinary corrugated iron could not be used on account of the drip, so that the roof will be covered with the Bridge Company's patent anti-condensation corrugated iron covering.

THE Charlestown (Mass.) Gas and Electric Company has closed a contract with the city by which the latter will get a gas supply for use in public buildings and public lamps at the rate of $1.25 per 1,000 cubic feet. The contract is to last for three years. The gas thus supplied will aggregate 12,000,000 cubic feet per annum.

SOME days ago the Montclair (N. J.) Town Council debated the subject of whether it would be prudent to discontinue the use of gas lamps for street lighting, substituting therefor incandescent electric lamps of 24 candle power each, and during the discussion the charge was freely made that incandescent electric lamps were perfect failures when it came to the province of street lighting. A sample instance of failure was given as Madison, not far from Bloomfield, where incandescent lamps are used because the district is not properly piped for gas. The debate ended in inaction.

THE authorities of Lawrence, Kas., have agreed to extend the franchise of the local Gas Company if the proprietors will reduce the selling rate to ordinary consumers to $1.75 per 1,000 cubic feet, and agree to maintain public lamps at the rate of $18 per post per annum, on a moontable schedule.

THE new gas works for Laconia, N. H., it is said, will be completed this season.

THE proprietors of the Oakland (Cal.) Gas, Light and Heat Company announce that on and after May 1st the following schedule will rule: Gas for illuminating purposes, $2 25 per 1,000 cubic feet—a reduction of 25 cents; gas used for fuel purposes, $2 per 1,000—also equal to a cut of 25 cents.

AT the annual meeting of the Knoxville (Tenn.) Gas Light Company no change was made in the executive management. The usual dividend was passed, the reasons for such omission being the decrease in business and the heavy expenditure incurred the past year in laying nine miles of new mains.

THE Vallejo (Cal.) electric light plant, in which it is said about $100,000 has been sunk by local capitalists, was sold at auction by the sheriff some days ago. It was bid in by ex Senator James McCudden, of Vallejo, for the sum of $2,850. It is said that it will be overhauled and enlarged.

THE proprietors of the the Bridgeton (N. J.) Gas Light Company have notified their consumers that on and after March 1st the selling rate will be $1.35 per 1,000 cubic feet, instead of $1.50, as at present.

AT the annual meeting of the Rome (N.Y.) Gas Light Company the following result was reached: Directors, J. D. Higgins, H. G. Utley, T. H. Stryker, Calvin Petrie, W. R. Huntington, T. W. Singleton and J. G. Bissell; President, T. H. Stryker; Vice-President, H. G. Utley; Secretary and Treasurer, W. R. Huntington.

ASSEMBLY bill No. 42, when considered in the New Jersey Senate, was introduced by an adverse report, which report was sustained by a vote

of 11 to 8. The bill was one authorizing incorporated towns and townships to establish and maintain electric light plants on public account.

PAUL JABLOCHKOFF, the inventor of the arc electric candle, died in Saratov, Russia, on the 5th inst. He was born in Serdosk, Russia, on September 14, 1847, and was only 23 years of age when he made the discovery which revolutionized street lighting by artificial means.

MR. C. F. SMITH, late of Havana, Cuba, will, on the 1st of May next, take charge of the gas plant at Lebanon, Pa., with the hopeful view of increasing consumption of gas, reducing cost of production and returning to the proprietors a profit. Mr. Smith was one of a half dozen applicants for the position, and his Yankee programme as outlined seems to be in touch with his Pennsylvania-German employers. His expectations are large, and his Penn. German Board of Managers are just waiting—waiting for the realization of his efforts.

MR. THOMAS P. BROWN, receiver of the Red Bank (N. J) Electric Light Company, sold the same at auction some days ago. The property was knocked down to Messrs. Applegate and Broadmeadow at their bid of $11, plus incumbrances. A good deal of money has been sunk in this venture.

THE Louisville (Ky.) *Times* says: "Quite a good deal of talk has been caused on Main street by a rumor which has gained considerable ground, to the effect that the probable action of the Gas Company in issuing and selling 5,000 or 6,000 additional shares of stock would be contrary to an agreement to not issue any stock within 12 months after the sale of last August. The rumor that the stock was to be issued has been denied by the officials of the Company. By a reference to the records of the Company it was learned from the old advertisements that there have been but two sales under the new charter. The first was on August 11th, 1892, when 2,291 shares were sold, and at which time notice was given that no stock would be issued before the closing of the fiscal year, on July 1, 1893. The second sale, on August 1, 1893, was accompanied by no such notice, and 2,000 shares were sold at that time, The prospective sale is being discussed with a great deal of interest on Main street."

WE append an abstract of the answer made by the Massachusetts Board of Gas and Electric Light Commissioners to the following order adopted by the Massachusetts Legislature on February 28: "*Ordered*, That the Board of Gas and Electric Light Commissioners be requested to investigate the methods of the Gas Companies operating in and around Boston, and determine whether, in their judgment, the gas consumers are being fairly and honestly dealt with, and whether the gas meters register accurately, and report their findings to the Legislature within four weeks from the time of the adoption of this order." The Board completed the investigation within the specified time, and they reported: "The Companies investigated by the Board were the Boston, Roxbury, Dorchester, South Boston, East Boston, Brookline, and Chelsea Companies. Of the 421 bills of the Boston Company examined, 363 show a decrease and 58 an increase. Of the decreased bills, in the first period, 5,318,000 feet were sold for $6,913 73; in the second period, 4,458,570 feet sold for $4,445.57. That is a decrease of $2,455.16. Of the increased bills in the first period, 1,900,325 feet sold for $1,204.17; in the second period, 1,605,520 feet sold for $1,605.55, an increase of $402.38. Net decrease of the 421 bills in the second period was $2,052.78. Percentage of decrease in the amount of the bills, 25.1 per cent.; of decrease from $1.30 to $1, 23.07 per cent.; of decrease in consumption, 2.6 per cent. From the 1893 bills of the Roxbury Company, a discount of 20 cents per 1,000 feet was allowed; from the 1894 bills a discount of 10 cents per 1,000 feet for prompt payment. Making these allowances it was found that of the 201 bills compared, 12 show an increase; 189 a decrease. The net decrease of the 201 was $954.26; percentage of decrease in amount of bills, 35.7 per cent.; of decrease from $1.50 to $1, 33.3 per cent.; of decrease in consumption, 3.9 per cent. Making allowances for discounts for prompt payment in the Dorchester Company, it is found that of the 200 bills examined, 62 show an increase and 138 show a decrease. The net decrease was $119.85; the percentage of decrease in the amount of the bills, 11.35 per cent.; of decrease from $1.50 to $1.30, 13.3 per cent.; of increase in consumption, 2.2 per cent. Two hundred bills of the South Boston Company were compared. After allowances, as in the other cases, for prompt payment, 43 show an increase, 157 a decrease. Net decrease was $392.41; percentage of decrease in the amount of bills, 16 per cent.; of decrease from $1.50 to $1.30, 13.33 per cent.; of decrease in consumption, 3 per cent. Two hundred and eleven bills of the East Boston Company, for November and December, 1892, and January, 1893, were compared with the bills of the same consumers, in the same houses, for November, 1893, and January, 1894; 64 show a decrease and 47 an increase. The net decrease was $1,331.57; the percentage of decrease in the amount of the bills was 19 per cent.; of decrease from $1.75 to $1.50, 14.28 per cent.; of decrease in consumption, 5.4 per cent. This Company has begun the monthly bill system, and no comparison was possible of monthly bills. One hundred and twenty seven bills of the Chelsea Company were compared, of which 65 show a decrease and 62 an increase. The net decrease was $250.31; percentage of decrease in the amount of bills was 17.9 per cent.; of decrease from $1.80 to $1.70, 5.5 per cent.; in consumption, 15 per cent. The result of the examination shows that in a large majority of cases bills in the second period have been reduced. There are, of course, instances where the bills have been increased. The initial pressure was next compared, with the following results: Boston Company, North End works, 1893, 2.6 inches; 1894, 2.58 inches. Boston Company, Gerard street, 1893, 3.24 inches; 1894, 3.16 inches. Roxbury Company, 1893, 3.03 inches; 1894, 2.57 inches. Dorchester Company, 1893, 3 11 inches; 1894, 3.21 inches. South Boston Company, 1886, 2.8 inches; 1894, 2.8 inches. East Boston, 1886, 2.2 inches; 1894, 2.4 inches. Chelsea, 1886, 2.7 inches; 1894, 2.4 inches. Brookline, 1886, 3.1 inches; 1894, 3.4 inches. Meters of persons whose gas bills had increased were examined. The law allows a meter to be stamped correct which does not vary 2 per cent. from the standard measure. The Companies whose meters show the largest errors were found to have had in their gas for a series of years more than the usual amount of ammonia. Of the meters examined the average error of the entire number (150) tested was 1.65 per cent. fast; and some of those examined had been in use from 10 to 20 years."

THE proprietors of the Phœnix Gas Light and Fuel Company, of Phœnixville, Pa., have not yet decided as to the water gas process which will be adopted in the reconstruction of the works.

THE Legislative Committee on Corporation Laws of the Massachusetts Assembly has reported two bills, one of which forbids gas and electric light companies from issuing stocks or bonds without the advice and consent of the Board of Gas and Electric light Commissioners. A violation of the law is to be punished by not more than $1,000 fine, or one year's imprisonment, or both. The other bill is to prevent foreign corporations from issuing stock or other securities upon the property or stock which it owns or controls of a domestic street railway, gas light or electric light corporation. The penalty is the dissolution of the domestic corporation.

A CORRESPONDENT forwards the following from Toronto, under date of April 13th, and relates to proceedings which were had in the Dominion Legislative Chamber on the date in question: "Mr. O'Connor's bill to declare the appliances of gas and electric light companies exempt from taxation came up this morning in the Municipal Committee, and, after consideration, was passed by an overwhelming majority. The room was filled with persons interested in the bill. Among those present were Messrs. Wm. Mulock, M.P., J. K. Kerr, Q.C., J. K. Macdonald, Wm. McCabe, S. G. Wood, Henry Sutherland, Henry O'Brien, Frederic Nicholls; Messrs. T. Littlehales, F. W. Gates and H. C. Baker representing the Hamilton Gas Company; Messrs. B. F. Folger, Kingston; B. F. Fraser and F. C. Taylor, Lindsay; George Macpherson, Stratford; Ald. McCully, St. Thomas; J. D. McDiarmid, Aylmer; J. E. Souch, Newmarket; and R. McGowan, Oakville, representing gas and electric companies in the smaller towns of the Province. Mr. J. K. Kerr presented the case for the Toronto Companies, and was followed by Mr. Z. A. Lash, Q.C., for the Bell Telephone Company. Mr. Caswell, Toronto City Solicitor, opposed the bill, citing English and American precedents, and was followed by City Solicitor McKelcan, of Hamilton, who took the same ground. Mr. F. C. Taylor, of Lindsay, spoke for the smaller companies, stating that they were anxious for the bill to pass, and that they in nearly all cases supply gas and light at cost to the consumers. He was followed by Messrs. George Macpherson, Stratford; Ald. McCully, St. Thomas, and J. D. McDiarmid, Aylmer, who corroborated his remarks. The Committee discussed the bill briefly, Mr. A. F. Wood thinking that the Companies should not be declared exempt though he did not think that it would be wise in many cases actually to tax them. Mr. Balfour opposed the bill, holding that it was purely in the interest of the Companies and not in that of the general public. Mr. Whitney favored the bill, and Mr. Waters took the same ground, saying that he did not see why the Companies should be treated otherwise than the railways, whose tracks are exempt. Mr. J. M. Clark (South Lanark) remarked that in his town no Council could be elected which would propose to tax the local electric light company; the interests of the two were identical. The vote was then taken, the principle of the bill being carried by 45 to 5. The five voting no were Messrs. Balfour, Tait, McNaughton, McCleary and McKay (Oxford). Mr. E. F. Clarke was absent and Dr. Ryerson voted with the majority. Some amendments were made in the bill, the words plant and machinery being struck out and some verbal changes made. That portion of the first clause which refers to the exemption of street plant was passed, but a prolonged debate arose over the second portion of the clause, which provides for taxation of dividends, Mr. Balfour wishing to make the taxation on the net income. The debate was finally adjourned."

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

MONDAY, APRIL 23, 1894.

The Market for Gas Securities.

Consolidated was sluggish during the early part of the week, but prices were fairly well maintained, and towards the close quite some activity was manifested in it, no less than 1,100 shares having been disposed of on the Exchange yesterday, the range being 136¼ to 137. To-day (Friday) the opening was 136¼ bid. Our prediction of some weeks ago that the gas rates for New York and Brooklyn would not be changed by the Legislature this year will evi dently be borne out. Standard preferred is bid for at 77, holders asking 81. Equitable is strong at 186 to 190, and Mutual is steady. Brooklyn shares are inclined to weakness, and we look for lower prices in them. Meanwhile, the project for consolidation slumbers. Chicago gas is enjoying another of its spurts, and to day opened at 68¼ bid. The decision in the *quo warranto* proceedings has not yet been received, but we fail to see how it can affect the value of the shares. Indeed, it looks that the gamblers' day for breaking Chicago gas is about over. The stock is cheap at 80, as an in vestment. Baltimore Consolidated is quoted at 66¼ bid; Bay State, 22¼ to 22½; Laclede com mon, 17 to 18; and Consumers, of Jersey City, is offered at 45.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,
16 Wall St., New York City.
April 23.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	136¼	137
Central	500,000	50	100	—
" Scrip	220,000	—	100	—
Equitable	4,000,000	100	186	190
" Bonds	1,000,000	—	106	108
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	108	112
Mutual	3,500,000	100	148	151
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	80	95
" Bonds	150,000	—	—	100
Richmond Co., S. I.	348,650	50	50	—
" Bonds	100,000	—	—	—
Standard Gas Co—				
Common Stock	5,000,000	100	24	27
Preferred	5,000,000	100	77	81
Yonkers		50	112	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	106	108
Citizens	1,200,000	20	55	—
" S. F. Bonds	320,000	1000	—	101
Equity Gas Light Co	2,000,000	100	—	—
Bonds	1,000,000	—	—	—
Fulton Municipal	3,000,000	100	135	—
" Bonds	300,000		103	—
Peoples	1,000,000	10	—	80
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	98	100
Metropolitan	870,000	100	130	—
" Bonds (5's)	70,000	—	100	—
Nassau	1,000,000	25	155	160
" Ctfs.	700,000	1000	99	100
Williamsburgh	1,000,000	50	135	—
" Bonds	1,000,000	—	107	110

Advertisers Index.

GAS ENGINEERS. Page

Jos. R. Thomas, New York City ... 595
Wm. Henry White, New York City ... 611
Fred. Bredel, New York City ... 607
H. C. Slaney, New York City ... 595
Geo. R. Rowland, New York City ... 595
Joseph P. Gill, New York City ... 565

CHEMISTS.

E. G. Love, New York City ... 607
Durand Woodman, New York City ... 595

PROCESSES.

Bartlett, Hayward & Co., Baltimore, Md ... 609
United Gas Improvement Co, Phila, Pa ... 601
Burdett Loomis, Hartford, Conn ... 611
National Gas and Water Co., Chicago, Ills ... 603
Economical Gas Apparatus Construction Co., Toronto, Ont. 602
The Western Gas Construction Co., Fort Wayne, Ind ... 602
A. M. Sutherland, New York City ... 602

GAS WORKS APPARATUS AND CONSTRUCTION.

James R. Floyd & Sons, New York City ... 611
Continental Iron Works, Brooklyn, N. Y ... 610
Delly & Fowler, Phila., Pa ... 611
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 608
Stacey Mfg. Co., Cincinnati, Ohio ... 611
Bartlett, Hayward & Co., Baltimore, Md ... 609
Davis & Farnum Mfg. Co., Waltham, Mass ... 608
R. D. Wood & Co., Phila., Pa ... 610
Isbell-Porter Company, New York City ... 610
Fred. Bredel, New York City ... 607
United Gas Improvement Co., Phila., Pa ... 601
Berlin Iron Bridge Company East Berlin, Conn ... 598
National Gas and Water Co., Chicago, Ills ... 603
Economical Gas Apparatus Construction Co., Toronto, Ont. 602
The Western Gas Construction Co, Fort Wayne, Ind ... 602
C. Cunningham, Brooklyn, N. Y ... 596

GAS AND WATER PIPES.

Ohio Pipe Co., Columbus, Ohio ... 613
M. J. Drummond, New York City ... 613
R. D. Wood & Co., Phila., Pa ... 610
Warren Foundry & Machine Co., New York City ... 613
Donaldson Iron Co., Emaus, Pa ... 613
Addyston Pipe and Steel Co., Cincinnati, O ... 613
John Fox, New York City ... 913

STEAM BLOWER FOR BURNING BREEZE.

H. E. Parson, New York City ... 607

GAS COALS.

Penn Gas Coal Co., Phila., Pa ... 605
Perkins & Co., New York City ... 604
Despard Gas Coal Co., Baltimore, Md ... 605
Westmoreland Coal Company, Phila., Pa ... 605

CANNEL COALS.

Perkins & Co., New York City ... 604
Log Mountain Coal, Coke and Timber Co., Pineville, Ky ... 605

GAS ENRICHERS.

Standard Oil Co., Cleveland, Ohio ... 605
The Sun Oil Co., Pittsburgh, Pa ... 605

COKE CRUSHER.

C. M. Keller, Columbus, Ind ... 605

INCLINED RETORTS.

Parker-Russell Mining and Mfg. Co., St. Louis, Mo ... 606

AIR COMPRESSORS.

Clayton Air Compressor Works, New York City ... 595

COAL TAR PUMPS.

Clayton Air Compressor Works, New York City ... 559

GAS GOVERNORS.

Connelly Iron Sponge and Governor Co., New York City ... 603
Wilbraham Baker Blower Co., Phila., Pa ... 603
Isbell-Porter Co., New York City ... 610

RETORTS AND FIREBRICK.

J. H. Gautier & Co., Jersey City, N. J ... 606
B. Kreischer & Sons, New York City ... 606
Adam Weber, New York City ... 606
Laclede Fire Brick Mfg. Co, St. Louis, Mo ... 606
Borgner & O'Brien, Phila., Pa ... 606
James Gardner, Jr., Pittsburgh, Pa ... 606
Henry Maurer & Son, New York City ... 606
Baltimore Retort and Fire Brick Co., Baltimore, Md ... 606
Parker-Russell Mining and Mfg. Co., St. Louis, Mo ... 606
Brooklyn Fire Brick Works, Brooklyn, N. Y ... 606
F. Behrend, New York City ... 595

CEMENTS.

C. L. Gerould & Co., Brooklyn, N. Y ... 605
F. Behrend, New York City ... 596

GASHOLDER TANKS.

J. P. Whittier, Brooklyn, N. Y ... 595
W. C. Whyte, New York City ... 595

GASHOLDER PAINT.

The Government Waterproof Paint Co., Boston, Mass ... 609
New York Marine Paint Co., Poughkeepsie, N. Y ... 609

SCRUBBERS AND CONDENSERS.

G. Shepard Page's Sons, New York City ... 612
R. D. Wood & Co., Phila., Pa ... 610
James R. Floyd & Sons, New York City ... 612
Continental Iron Works, Brooklyn, N. Y ... 610

REGENERATIVE FURNACES.

Bartlett, Hayward & Co., Baltimore, Md ... 609
Fred. Bredel, New York City ... 607
J. H. Gautier & Co., Jersey City, N. J ... 607
Parker-Russell Mining and Mfg. Co., St. Louis, Mo ... 606

GAS GAUGES.

The Bristol Co., Waterbury, Conn ... 607

TAR AND CARBONIC ACID EXTRACTOR.

Geo. Shepard Page's Sons, N. Y. City ... 576

AMMONIA CONCENTRATOR.

Michigan Ammonia Works, Detroit, Mich ... 595

GAS METERS.

John J. Griffin & Co., Phila., Pa ... 614-616
American Meter Co., New York and Philadelphia ... 615
The Goodwin Meter Co., Philadelphia, Pa ... 472
Helme & McIlhenny, Phila., Pa ... 615
D. McDonald & Co., Albany, N. Y ... 615
Nathaniel Tufts, Boston, Mass ... 614
Maryland Meter and Manufacturing Co., Baltimore, Md ... 614
Harris Bros. & Co., Philadelphia, Pa ... 614
Metric Metal Co., Erie, Pa ... 613

SELF-SEALING MOUTHPIECE DOORS.

Isbell-Porter Company, New York City ... 610
Continental Iron Works, Brooklyn, N. Y ... 610

BURNERS.

C. A. Gefroter, Phila., Pa ... 595
Moses G. Wilder, Phila., Pa ... 595

LAVA GAS TIPS.

D. M. Steward Mfg. Co., Chattanooga, Tenn ... 595

STREET LAMPS.

J. G. Miner, Morrisania, New York City ... 607
Bartlett Street Lamp Mfg. Co., New York City ... 607

PURIFYING MATERIAL.

Connelly Iron Sponge and Governor Co., New York City ... 603
Greenpoint Chemical Works, Brooklyn, N. Y ... 603
Henry W. Douglas, Ann Arbor, Mich ... 603
Read, Holliday & Sons, Ltd., New York City ... 595

ELECTRICAL APPARATUS.

Wm. Henry White, N. Y. City ... 611
Fort Wayne Electric Co., Fort Wayne, Ind ... 339

EXHAUSTERS.

The P. H. & F. M. Roots Co., Connersville, Ind ... 600
Isbell-Porter Company, New York City ... 610
Wilbraham Baker Blower Co., Philadelphia, Pa ... 603
Connelly Iron Sponge and Governor Co., New York City ... 603

VALVES.

Ludlow Valve Manufacturing Co., Troy, N. Y ... 609
Chapman Valve Manufacturing Co., Boston, Mass ... 609
R. D. Wood & Co., Phila., Pa ... 610
Continental Iron Works, Brooklyn, N. Y ... 610
John Fox, New York City ... 613
The P. H. & F. M. Roots Co., Connersville, Ind ... 600
Isbell-Porter Co., New York City ... 610

GAS ENGINES.

Schleicher, Schumm & Co., Phila., Pa ... 580

ENGINES AND BOILERS.

The Hazelton Boiler Co., New York City ... 597

PURIFIER SCREENS.

John Cabot, New York City ... 607

GAS STOVES.

American Meter Co., New York and Philadelphia ... 599
The Goodwin Meter Co., Phila., Pa ... 472
George M. Clark & Co., Chicago, Ills ... 537
Maryland Meter and Manufacturing Co., Baltimore, Md ... 614
The Schneider & Trenkamp Co., Cleveland, O ... 596

PATENTS.

H. B. Willson & Co., Washington, D. ... 595

WANTED,

Man as General Foreman of Meter and Service Department

of Gas Company in large city. Address, stating experience and salary expected,

985-1 "PERMANENT," care this Journal.

Engagement Desired.

A Gas Engineer

of 20 years' experience in the manufacture of coal and water gas, and in the building and general superintendence of works, desires an engagement. Satisfactory references can be given.

Address "ENGINEER,"

981-tf Care this Journal.

POSITION WANTED

As Manager of Gas Works.

Has held a similar position for five years in works manufacturing over 10 million feet per annum. Well up in main laying, manufacture of sulphate of ammonia, and is a good chemist and accountant. First-class testimonials. Address

981-4 "R. H. W.," care this Journal.

Situation Wanted

As Superintendent of a Gas Works,

by an energetic young man who has had experience in the construction and operation of water and electric plants Would take a situation as salesman for gas stoves, electric apparatus, coal company, or anything in the gas line. Is well acquainted with that class of trade. Address

984-2 "BOSTON," care this office.

SITUATION WANTED

By a competent man who

Thoroughly Understands the Ammonia Business.

making Sulphate, Concentrated or Aqua Ammonia.

981-2 Address "AMMONIA, care this Journal.

Position Desired

As Superintendent of a Gas Works

by a practical engineer of many years' experience in the manufacture and distribution of gas, and has had considerable experience on construction and extensions. Good references can be furnished. Address

983 5 "BUENA," care this Journal.

WANTED,

Two Second-Hand Gas Engines,

of 50 horse power each. Must be in No. 1 condition and low price. Also,

One Second-Hand Station Meter,

10 inch connections.

983-4 PEKIN GAS LIGHT CO., Pekin, Ills.

AMERICA'S GREATEST RAILROAD.

N.Y. Central & Hudson River Railroad.

FAST TIME. SUPERIOR SERVICE.

Trains Lighted with Pintsch Gas.

GRAND CENTRAL STATION,

42d St. & 4th Av., N. Y. City.

Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

Ammonia Concentrator.

Not Expensive. Write to

STROH & OSIUS, Pat'ees, or Mich. Ammonia Works, Detroit, Mich.

AIR COMPRESSORS

For Compressing Gases, Testing Purposes, Operating Oil Burners under Furnaces, and every other Purpose.

COAL TAR PUMPS.

Send for Catalogue.

CLAYTON AIR COMPRESSOR WORKS,

26 Cortlandt Street, New York.

DURAND WOODMAN, Ph.D.,

Analytic and Technical

CHEMIST.

Fuel and Gas Coals, Gas, Materials for Purification, Water, etc.

Laboratory, 127 Pearl (80 Beaver) St. N. Y.

PATENTS

Promptly secured. Trade-Marks, Copyrights and Labels registered. Twenty-five years experience. We report whether patent can be secured or not, free of charge. Our fee not due until patent is allowed. 32 page Book Free. H. B. WILLSON & CO., Attorneys at Law, Opp. U. S. Pat. Office. WASHINGTON, D. C.

JOS. R. THOMAS,

No. 32 Pine Street, N.Y. City.

CONSULTING AND CONSTRUCTING

Gas Engineer and Contractor.

PLANS, SPECIFICATIONS, AND ESTIMATES FURNISHED.

Contracts taken for all Appliances required at a Gas Works,

Either for New Works or Extensions to Old Plants.

H. C. SLANEY,

Gas Engineer

466 Sixth Street, Brooklyn, N. Y.

Plans, Specifications and Estimates furnished for New Works, Alteration or Extension of Old Plants.

JOSEPH P. GILL,

GAS ENGINEER,

59 Liberty St. (Room 31), N. Y. City.

Plans, Estimates and Specifications furnished for new works, Coal or Water Gas, and for alterations and extensions.

GEORGE R. ROWLAND,

Formerly with the Continental Iron Works.

Draughtsman and Constructing Engineer.

Drawings, Specifications and Estimates furnished for the construction of new works or alteration of old works. Special attention given to Patent Office drawings.

Office, No. 245 Broadway, N. Y. City.

Read, Holliday & Sons, Ltd.

No. 7 Platt St., N. Y. City.

HYDRATED OXIDE OF IRON

For Gas Purification.

Analysis, Samples and Particulars on Application.

F. BEHREND,

SOLE IMPORTER OF THE CELEBRATED

German (Stettin-Didier) Clay Gas Retorts,

BLOCKS, TILES, FIREBRICKS, FIRE CEMENT,

Stettin "Anchor" & "Eagle" Brand Portland Cement

10 & 12 Old Slip, New York.

Gasholder Tank Construction, Etc.

Gas Companies and others about to erect Gasholders will find it profitable to consult W. C. Whyte, who for over 30 years has made a specialty of

Tank Excavation & Mason Work.

Fifty tanks now in operation show the sort of work done.

W. C. WHYTE, 136 Liberty St, New York.

GASHOLDER TANKS AND GAS WORKS MASONRY COMPLETE.

Plans prepared and Estimates furnished at short notice.

J. P. WHITTIER,

70 Rush St., Near Division Ave., **Brooklyn, N. Y.**

MOSES G. WILDER,

Mechanical Engineer,

816-822 Cherry St., Phila., Pa.

MANUFACTURER OF

Gas Governors,

Governor Gas Burners,

Gas Cocks and Fittings,

In addition to a full assortment of Volumetric Governors, etc., I am now making **MERCURY PRESSURE GOVERNORS** of all the usual sizes, adapted to use upon *Gas Stoves, Furnaces, and Meters.* The same careful attention to details of design and workmanship which has established the reputation of **WILDER'S VOLUMETRIC GOVERNORS** will be given to the new line. They have been thoroughly tested in many places during the past year, and have given entire satisfaction. The price is very low, and but for a complete system of machinery adapted to this work, it would be impossible to sell them at the price. I hope for large orders, as they become known, in consequence of the low price and good quality.

Patent Lava Gas Tips.

UNIFORMITY GUARANTEED.

ALL SIZES AND SHAPES.

D. M. STEWARD MFG. CO.,

CHATTANOOGA, TENN.

To Gas Companies.

We make to order **CAP BURNERS** to burn any amount under a stated pressure. Send for samples.

Also, **SERVICE CLEANERS, DRIP PUMPS,** and **STREET MAIN PROVING APPARATUS.**

C. A. GEFRORER,

248 N. 8th St., Phila., Pa.

NAPHTHA TANK CONSTRUCTION A SPECIALTY.

Gas Companies intending to erect

Tanks for Naphtha Storage

ought to communicate with

CHRISTOPHER CUNNINGHAM,

Proprietor of the

Novelty Steam Boiler Works.

Best Material and Best Workmanship at Lowest Possible Rates. Refers by permission to the Boston Gas Light Company, the Worcester, Mass., Gas Company, and dozens of others.

Greenpoint Avenue and Newtown Creek, - - - BROOKLYN, N. Y.

RELIABLE GAS STOVES AND RANGES FOR 1894.

Seven Distinct Lines.

Ninety-six Different Styles.

Ranging in Price from $3.00 to $70.00.

SEND FOR 1894 CATALOGUE OF GAS RANGES.

WE HAVE ADDED AN ENTIRE NEW LINE OF CHEAP GAS RANGES FOR 1894.

Also Five Lines with Side Broiler.

New Designs and Improvements for 1894. The Largest and Most Complete Line Ever Manufactured under one name.

THE SCHNEIDER & TRENKAMP CO.

479-501 Case Ave., Cleveland, Ohio.

Sole Manufacturers of Reliable Gas Ranges.

JEWEL GAS STOVES

Are Unequaled.

The New No. 393. $49.00.

For 1894.

78 Styles,

Listing from 75 Cents to $68.00.

Send for Catalog.

Reduction in List.

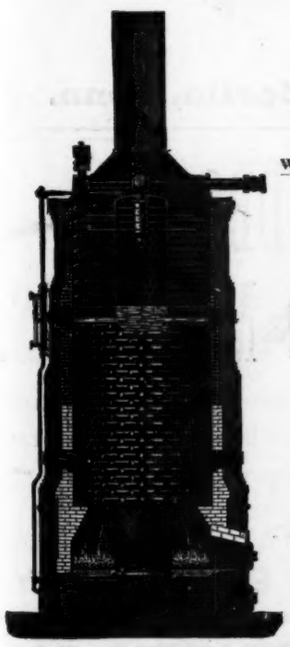
George M. Clark & Company,

MAKERS,

149-161 Superior Street, Chicago.

The HAZELTON BOILER Frequently Called The PORCUPINE BOILER

Patented in America and Abroad.



UPWARDS OF

100,000 HORSE POWER

of this Justly Celebrated Water-Tube Boiler in Successful Operation in all the Principal Industries.

An Unparalleled Record of many years for Economy, Durability, Safety and Efficiency.

A Common-Sense High-Pressure Boiler made in a Superior Manner in Our Own Works.

We Solicit for it the Critical Examination of the Mechanical Profession and the Steam-Using Public.

THE HIGHEST STANDARD OF EXCELLENCE.

Standard Sizes, 50 H.P. to 500 H.P.

THREE REGISTERED
THE HAZELTON BOILER.

THE PORCUPINE BOILER.
TRADE MARKS.

Special Waste-Heat Boilers for Rolling and Other Mills.

All Genuine Boilers of this Type bear our Three Registered Trade Marks.

BEWARE OF IMITATIONS.

Write for Illustrated Catalogue. **Correspondence Solicited.**

This Company is prepared to Manufacture and Furnish Plants of Boilers of any desired capacity, and will forward proposals and other information on application. All imitations of the substantial features of this Boiler are infringements, and will be prosecuted to the full extent of the law.

ESTABLISHED 1884.
INCORPORATED 1888.

FOUNDED BY
JOHN P. KENNEDY & SONS.

E. S. T. KENNEDY, President.
W. T. KENNEDY, Vice-President.
J. B. REEVE, Secretary.

THE HAZELTON BOILER CO., Sole Proprietors and Manufacturers 716 E. 13th St., New York, U.S.A.

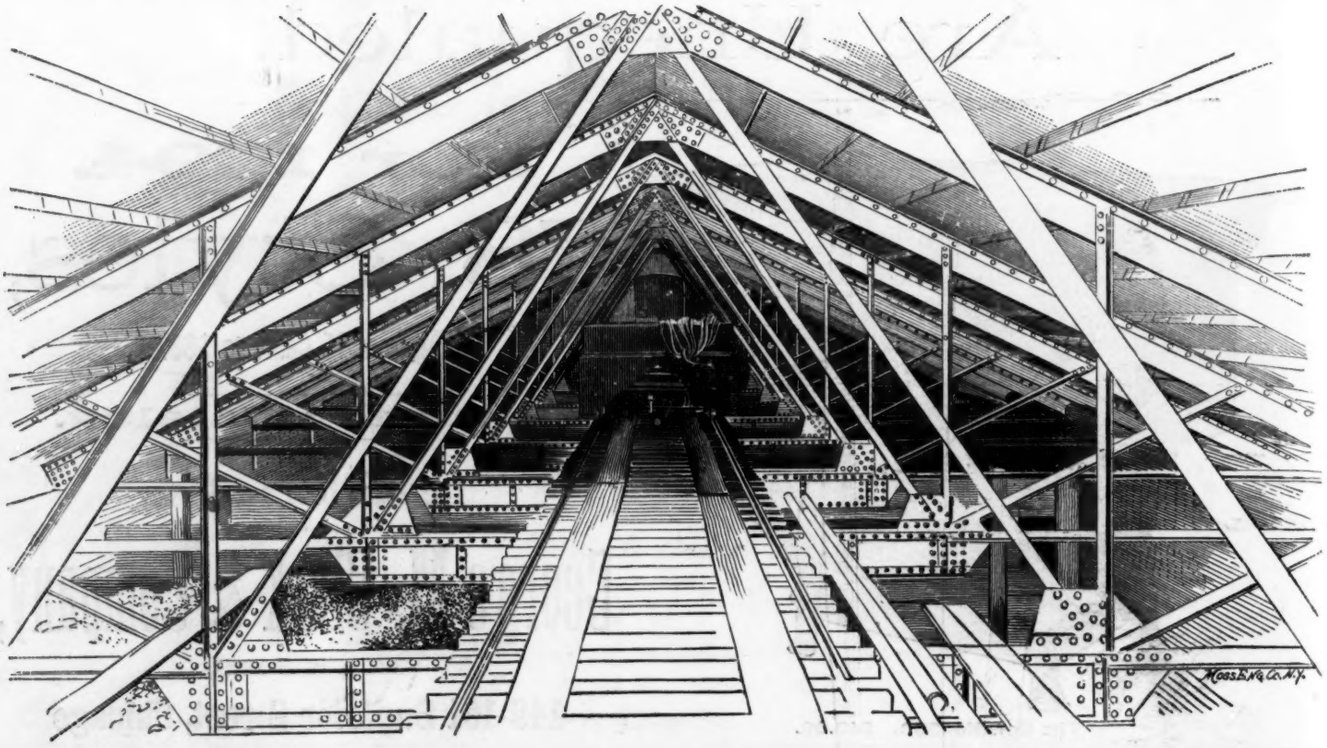
The Original and Only Manufacturers of this Type of Boiler. Cable Address, "PAILA," New York. Long Distance Telephone, 1229-18th St., New York.

This Boiler is producing unequaled results in the works of many of the principal Gas Co.'s of the U.S., and in similar plants in Foreign Countries.

NOT CONNECTED WITH ANY OTHER CONCERN IN THE UNITED STATES.

CHAS. M. JARVIS, Prest. & Chief Engineer. BURR K. FIELD, Vice-President. FRANK L. WILCOX, Treasurer. GEO. H. SAGE, Secretary.

THE BERLIN IRON BRIDGE CO.



The above illustration is taken direct from a photograph, and shows an Iron Truss Roof designed and built by us for the Burlington City Water Works, at Burlington, Vt. The building is used for storing coal, and the roof is designed to carry a track through the trusses, so that the coal can be distributed from the car, and thus save handling. The roof is entirely of iron, no woodwork being used about it in any way, shape or manner, so that it is absolutely fireproof.

Write for Illustrated Catalogue.

Office and Works, No. 6 Railroad Avenue, East Berlin, Conn.

Fuel and Its Applications

By E. J. MILLS, D.Sc. F.R.S., and F. J. ROWAN, C.E., assisted by others, including Mr. F. P. Dewey, of the Smithsonian Inst., Wash., D. C.

PLATES, AND 607 OTHER ILLUSTRATIONS. ROYAL OCTAVO, PAGES XX, 802. HANDSOME CLOTH, $7.50.

A. M. CALLENDER & CO., 32 Pine St., N. Y.

BOOKS.

DISTILLATION OF COAL TAR AND AMMONIACAL LIQUOR.

By GEORGE LUNGE. Price $12.50.

A TREATISE ON THE COMPARATIVE COMMERCIAL VALUES OF GAS COALS AND CANNELS.

By DAVID A. GRAHAM. 8vo., Cloth. Price $3.

Orders for these books may be sent to this office.

A. M. CALLENDER & CO.,
43 PINE ST., N. Y. CITY

NEWBIGGING'S HANDBOOK FOR GAS ENGINEERS AND MANAGERS.

The present (the fifth) edition marks an important advance on those that have gone before. Considerable additions have been made to the text and much of it has been rewritten and otherwise improved.

Price, Cloth, $6.

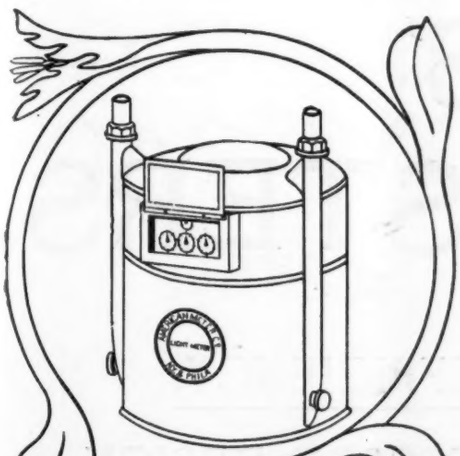
A. M. CALLENDER & CO., 32 Pine St., N. Y.

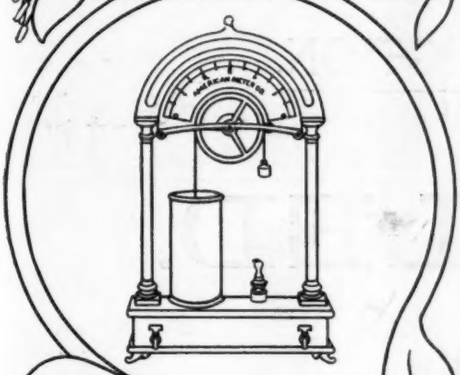
THE CHEMISTRY OF ILLUMINATING GAS.

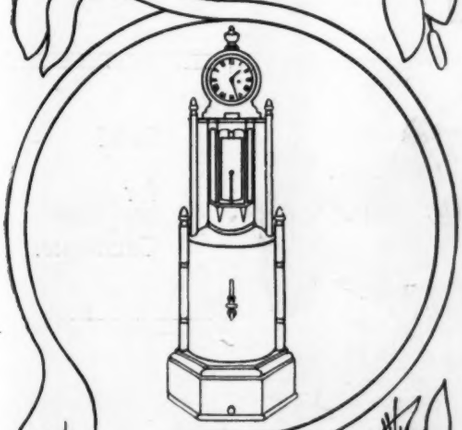
By NORTON H. HUMPHRYS. Price, $2.40.

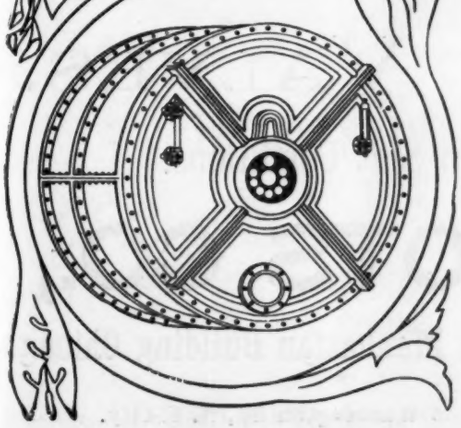
Orders may be sent to

A. M. CALLENDER & CO., No. 32 Pine Street, New York City.









AMERICAN METER CO.

ESTABLISHED 1834. INCORPORATED 1863.

NEW YORK and PHILADELPHIA.

CHICAGO, CINCINNATI,

ST. LOUIS, SAN FRANCISCO.

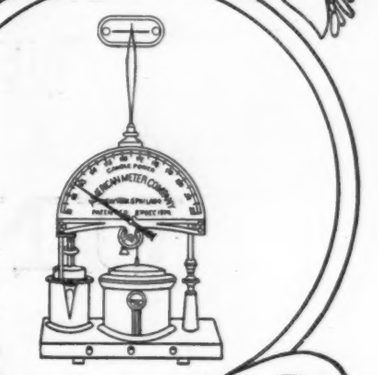
PUBLIC LIGHTING TABLE.

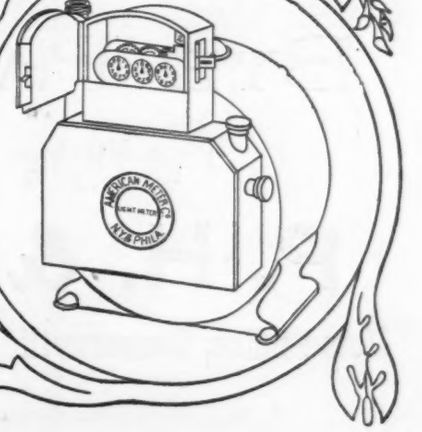
MAY, 1894.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Tue.	1	7.20 PM	4.00 AM	6.45	4.00
Wed.	2	7.20	4.00	6.45	4.00
Thu.	3	7.30	4.00	6.45	4.00
Fri.	4	7.30	4.00	6.45	4.00
Sat.	5	7.30 NM	4.00	6.45	4.00
Sun.	6	7.30	3.50	6.45	4.00
Mon.	7	7.30	3.50	6.55	3.40
Tue.	8	7.30	3.50	6.55	3.40
Wed.	9	7.30	3.50	6.55	3.40
Thu.	10	11.10	3.50	6.55	3.40
Fri.	11	11.50	3.50	6.55	3.40
Sat.	12	12.20 AM FQ	3.50	6.55	3.40
Sun.	13	12.50	3.50	6.55	3.40
Mon.	14	1.10	3.50	7.00	3.30
Tue.	15	1.40	3.50	7.00	3.30
Wed.	16	2.00	3.40	7.00	3.30
Thu.	17	No L.	No L.	7.00	3.30
Fri.	18	No L.	No L.	7.00	3.30
Sat.	19	No L. FM	No L.	7.00	3.30
Sun.	20	7.40 PM	9.40 PM	7.00	3.30
Mon.	21	7.40	10.40	7.10	3.15
Tue.	22	7.40	11.30	7.10	3.15
Wed.	23	7.40	12.10 AM	7.10	3.15
Thu.	24	7.50	12.50	7.10	3.15
Fri.	25	7.50	1.20	7.10	3.15
Sat.	26	7.50	1.40	7.10	3.15
Sun.	27	7.50 LQ	2.00	7.10	3.15
Mon.	28	7.50	2.20	7.15	3.15
Tue.	29	7.50	2.50	7.15	3.15
Wed.	30	7.50	3.10	7.15	3.15
Thu.	31	7.50	3.30	7.15	3.15

TOTAL HOURS LIGHTING DURING 1894.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	244.10	January	423.20
February	195.30	February	355.25
March	206.20	March	355.35
April	169.40	April	298.50
May	162.10	May	264.50
June	135.40	June	234.25
July	146.30	July	243.45
August	162.20	August	280.25
September	174.10	September	321.15
October	211.20	October	374.30
November	221.00	November	401.40
December	245.30	December	433.45
Total	2274.20	Total	3987.45





ROOTS' GAS EXHAUSTERS.

IN POINTS OF

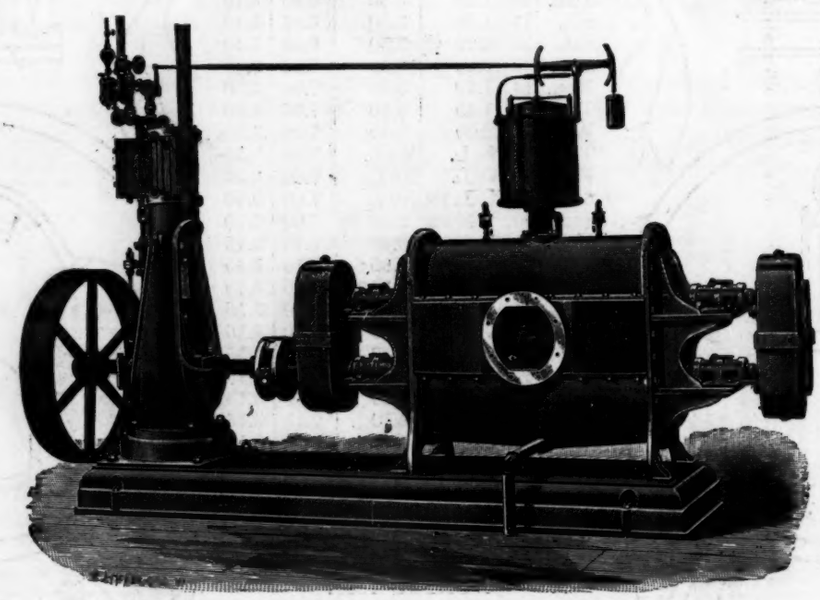
SIMPLICITY, DURABILITY, EFFICIENCY,

ECONOMY OF POWER, NEATNESS OF DESIGN,

MECHANICAL CONSTRUCTION,

THEY ARE

UNEQUALED.



Inquiries Cheerfully Answered.

Send for Catalogue.

BYE-PASS AND GAS VALVES.

Pipe Fittings of all Kinds and Designs to Suit Conditions.

P. H. & F. M. ROOTS CO.,

Home Office, Connersville, Ind. **Branch Office, 501 Manhattan Building Chicago.**

S. S. TOWNSEND, Gen. Agt., COOKE & CO., Selling Agts., 163-165 Washington St., N. Y. City.

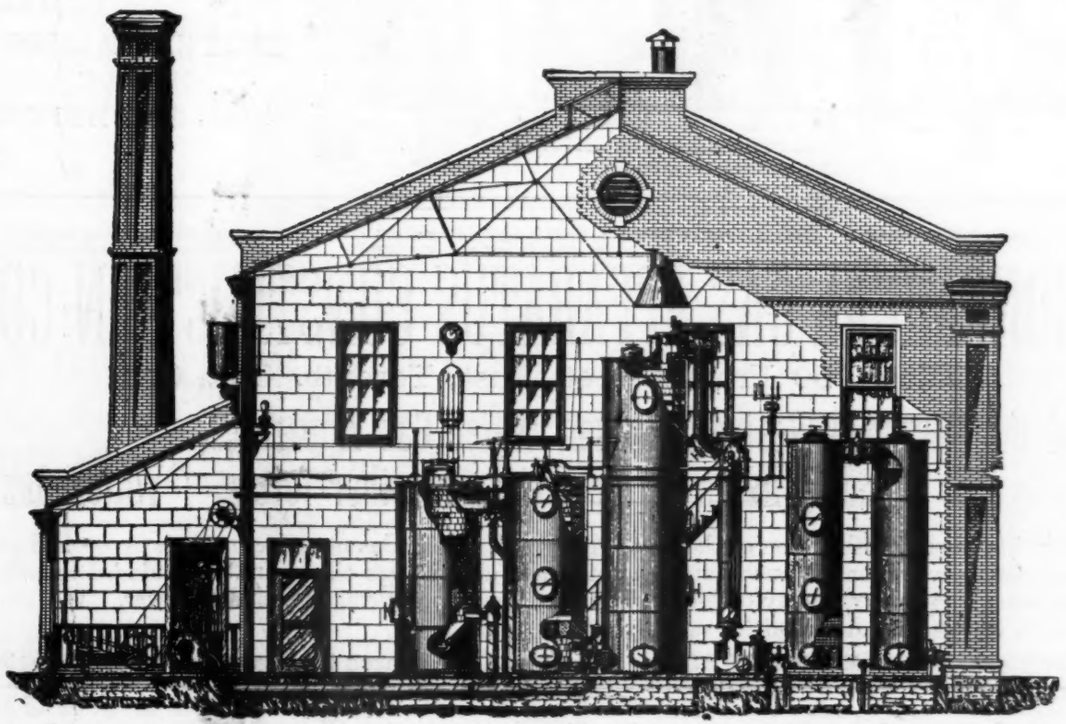
THE UNITED GAS IMPROVEMENT CO.,

DREXEL BUILDING, PHILA., PA.

Inquiries from any part of the United States should be addressed to the Philadelphia Office.

BUILDERS OF

THE STANDARD LOWE WATER GAS APPARATUS.



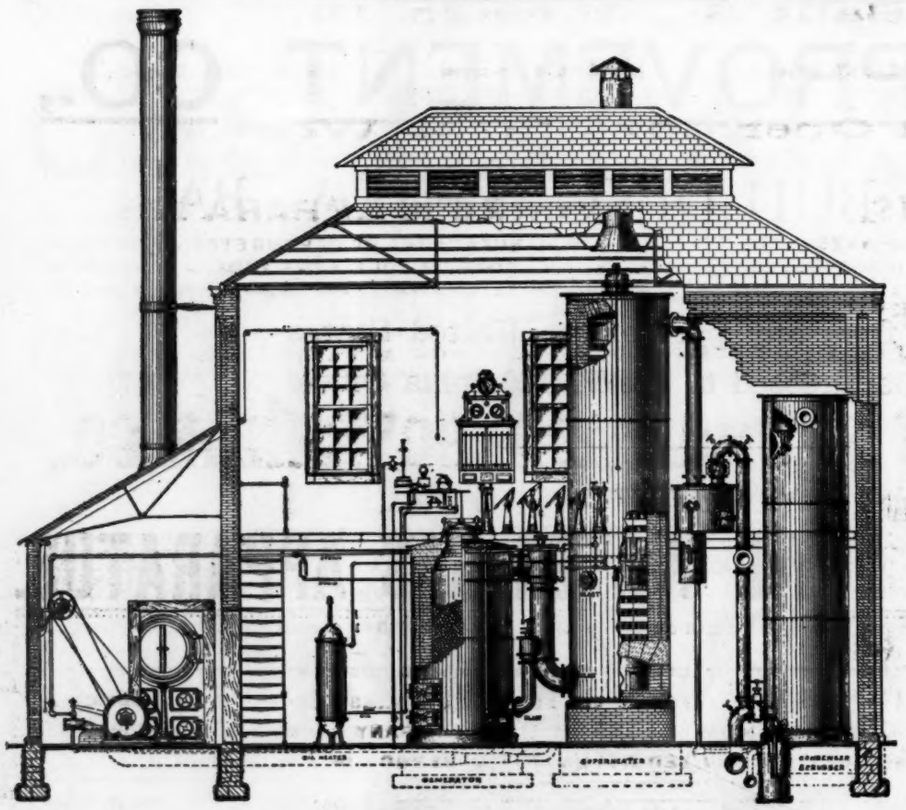
Standard "Double Superheater" Lowe Apparatus, designed for the use of Naphtha, Crude Oil, or "Distillates."

BUILDERS, LESSEES AND PURCHASERS OF GAS WORKS.

Water Gas Plants, either independent or auxiliary to Coal Gas Works, erected to meet any conditions. Apparatus designed to use any grade of Oil, and Anthracite Coal, or Gas House or Oven Coke.

PAMPHLETS, PLANS AND ESTIMATES FURNISHED UPON APPLICATION.

THE WESTERN GAS CONSTRUCTION CO.



FORT WAYNE, IND.

Engineers & Builders.

IMPROVED LOWE

Water Gas Apparatus.

PURIFIERS,
CONDENSERS,
SCRUBBERS,
EXHAUSTERS,
CENTER VALVES,
operating 1 to 4 Boxes.
COAL GAS BENCHES,
Etc., Etc.

W. H. PEARSON, President. J. T. WESTCOTT, Gen'l Mang'r & Treas. (Formerly with The United Gas Improvement Co.) L. L. MERRIFIELD, Chief Engineer. (Formerly with the United Gas Improvement Co.)

The ECONOMICAL GAS APPARATUS CONSTRUCTION CO., Ltd.

Office, 269 Front Street, East, Toronto, Ont., Can.

Owners of the Merrifield-Westcott-Pearson Water Gas Apparatus, and Builders of the Lowe and other forms of Water Gas Plants.

Our system includes a combination of the best processes of Water Gas manufacture now in use, and an apparatus of novel construction, which enables us to make a better and cheaper gas than can be produced by any other process. Guarantees given as to quantity of fuel and oil used, make per diem, and candle power. We also make an apparatus which is especially designed for small Gas Companies.

CORRESPONDENCE SOLICITED. Plans and Estimates Furnished upon Application.

The "Little Giant" Water Gas Generator

IS THE MOST ECONOMICAL GENERATOR IN THE WORLD, BOTH IN COST AND OPERATION.

It takes but little room. It requires no change to be made in the height or depth of gas houses.

It is simpler and easier operated. It makes *more good gas from a given quantity of stock.* It makes good gas from *cheaper stock.* It makes gas of *any desired candle power* up to thirty without smoke. It makes a faultless gas from whatever gas-producing materials are cheapest in the locality where required, using hard coal or coke in connection with Lima crude or any other crude petroleum or its distillates, including *naphtha of any specific gravity.*

I build these Generators with any required capacity, from 3,000 cubic feet per hour upward. All the plants which I have built for the past four years can be seen in operation. Results are, in all cases, better than guaranteed.

In more than one half the gas works in the country the "Little Giant" will enable *one man* to easily make, in *five hours,* all the gas needed for the *twenty-four hours.*

Everything is guaranteed, including durability and capacity of the Generator, the quality of the gas, and its cost.

Correspondence solicited.

A. M. SUTHERLAND, No. 136 Liberty Street, New York City.

NATIONAL GAS AND WATER CO.,

218 La Salle St., Chicago, Ill.

HENRY C. REW, President. N. A. McCLARY, Secretary. IRWIN REW, Treasurer. E. E. MORRELL, Engineer.

Builder and Operator of Gas Works.

SOLE OWNER OF THE
REW APPARATUS,
FOR THE MANUFACTURE OF CARBURETED WATER GAS DIRECTLY FROM LOW GRADE SOFT COAL AND CRUDE OIL AND NAPHTHA.
A DEMONSTRATED SUCCESS.

SOLE OWNER OF THE
MORRELL APPARATUS,
FOR THE MANUFACTURE OF CARBURETED WATER GAS FROM HARD COAL OR COKE AND CRUDE OIL OR NAPHTHA. A WELL-KNOWN TYPE, SIMPLE, ECONOMICAL AND EFFICIENT.

PLANS AND GUARANTEED ESTIMATES FURNISHED UPON APPLICATION.

CONNELLY IRON SPONGE AND GOVERNOR CO.,

(Successors to CONNELLY & CO.)

MANUFACTURERS OF GAS WORKS SPECIALTIES.

"IRON SPONGE." Saves money, saves labor, and is the most efficient purifying material ever offered as a substitute for lime. We guarantee a large saving, both in cost of material and labor.

AUTOMATIC GOVERNOR. OVER FOUR HUNDRED NOW IN USE! NO WORKS COMPLETE WITHOUT IT! WILL PAY FOR ITSELF WITHIN A YEAR! ITS SERVICE SECURES PERFECT DISTRIBUTION; REDUCES LEAKAGE TO MINIMUM, and BENEFITS THE COMPANY and CONSUMER ALIKE! IT IS THE ONLY RECOGNIZED AUTOMATIC GOVERNOR IN THE WORLD!

STEAM JET EXHAUSTER. Designed particularly for small works. Combines Exhaust Tube, Steam Governor, Gas Compensator and Bye-Pass Valves in the most compact form possible. Occupies but little space; uses very little steam; saves formation of carbon in retorts; increases yield 10 to 15 per cent. No works too small to use them profitably.

Prices given on all our specialties, delivered at any point in the United States. Correspondence solicited.

CONNELLY IRON SPONGE AND GOVERNOR CO., No. 365 Canal St., New York.

WILBRAHAM BAKER BLOWER COMPANY,

Successors to WILBRAHAM BROS.,

Philadelphia, Pa.,

SOLE MAKERS OF

THE HUNTOON GAS GOVERNOR,

The Best Governor in the Market for Rotary or Steam Jet Exhausters.

Wilbraham Gas Exhausters,

BAKER ROTARY PRESSURE BLOWERS,

And Rotary Piston Pumps.

Catalogues and Prices on Application.

IRON MASS

For Gas Purification.

Acts immediately, and more efficiently than any other purifying agent now in use.

Greenpoint Chemical Works.

JOHN SCHRIEVER, Manager.

Greenpoint Ave. & Newtown Creek, Brooklyn N.Y.

DOUGLAS' FERRIC OXIDE

For Gas Purification

Is a superior natural Hydrated Oxide of Iron. Will give a higher purification per bushel than any other material. We ship the pure Oxide of Iron, containing no sawdust, thus effecting a saving in freight, leaving the consumer to furnish the diluent at a nominal cost. It is now used by the largest gas companies in the West.

Full information, with references to many users, and prices delivered in any locality, furnished on application to

H.W. Douglas (Supt. Ann Arbor Gas Company) **Ann Arbor, Mich.**

JAMES D. PERKINS. **PERKINS & CO.,** F. SEAVERNS.

228 & 229 Produce Exchange, New York City.

TIDEWATER SALES AGENTS FOR THE FOLLOWING

Standard Gas Coals and Cannel:

Ocean Mine Youghiogheny Gas Coal,

Clinch Valley Gas Coal, and the

Old Kentucky Shale, for Enriching Purposes.

Cargo Shipments from New York, Philadelphia, Baltimore and Norfolk.

Single carloads or more delivered at any required point in the United States or Canada.

SCIENTIFIC BOOKS.

KING'S TREATISE ON THE MANUFACTURE OF COAL GAS. Three vols.; $10 per vol.

GAS MANUFACTURE, by WILLIAM RICHARDS. 4to., with numerous Engravings and Plates, in Cloth binding. $12.

TECHNICAL GAS ANALYSIS. $3.

GAS CONSUMER'S GUIDE. $1.

GAS CONSUMER'S HANDBOOK, by WILLIAM RICHARDS, C.E.; 18mo., Sewed. 30 cents.

A PRACTICAL TREATISE ON GAS AND VENTILATION with Special Relation to Illuminating, Heating, and Cooking by Gas, by E. E. PERKINS. $1.25.

CHEMISTRY OF ILLUMINATING GAS, by NORTON H. HUMPHRYS. $2.40.

PRACTICAL TREATISE ON HEAT, by THOMAS BOX. Second edition. $5.

PRACTICAL PHOTOMETRY: A GUIDE TO THE STUDY OF THE MEASUREMENT OF LIGHT. By W. J. DIBDIN. $3.

STRAINS IN IRONWORK, by H. ADAMS. With plates. $1.75

GAS WORKS—THEIR ARRANGEMENT, CONSTRUCTION, PLANT, AND MACHINERY. $5.

COAL; ITS HISTORY AND USE, by PROF. THORPE. $3.50.

THE GAS WORKS OF LONDON, by COLBURN. 60 cents.

HEAT A MODE OF MOTION, by JOHN TYNDALL. $2.50.

THE MANAGEMENT OF SMALL GAS WORKS, by C. J. R. HUMPHREYS. $1.

MANUAL FOR GAS ENGINEERING STUDENTS, by D. LEE, 40 cents.

THEORY OF HEAT, by J. CLERK-MAXWELL. $1.25.

AMMONIA AND AMMONIUM COMPOUNDS, by DR. R. ARNOLD. $2.

THE DOMESTIC USES OF COAL GAS, AS APPLIED TO LIGHTING, by W. SUGG. $1.40.

DIGEST OF GAS LAW. $5.

DISTILLATION OF COAL TAR AND AMMONIACAL LIQUOR, by GEO. LUNGE. New Edition. $12.50.

A TREATISE ON THE COMPARATIVE COMMERCIAL VALUES OF GAS COALS AND CANNELS, by D. A. GRAHAM 8vo., Cloth. $3.

THE AMERICAN GAS ENGINEER AND SUPERINTENDENT'S HANDBOOK, by WM. MOONEY. $3.

A TEXT BOOK OF INORGANIC CHEMISTRY, by Professor VICTOR VON RICHTER. $2.

ILLUMINATING AND HEATING GAS, by W. BURNS. $1.50.

HANDBOOK FOR MECHANICAL ENGINEERS, by HENRY ADAMS. $2.50.

FUEL AND ITS APPLICATIONS. $7.50.

NEWBIGGING'S HANDBOOK FOR GAS ENGINEERS AND MANAGERS, by THOS. NEWBIGGING. Fifth edition. $6.

A TREATISE ON MASONRY CONSTRUCTION. BARKER. $5

ELECTRICITY.

THE ELEMENTS OF ELECTRIC LIGHTING, Including Electric Generation, Measurement, Storage, and Distribution, by PHILIP ATKINSON. $1.50.

ELEMENTARY ELECTRICITY, by PROF. F. JENKIN. 40 cts

ELECTRIC TRANSMISSION OF ENERGY, by G. KNAPP. $3

ARC AND GLOW LAMPS, by J. MAIER. Illustrated. $3.

ELECTRICIAN'S POCKET-BOOK, by MONROE and JAMIESON. $2.50.

MAGNETISM AND ELECTRICITY, by J. OVERREND. 40 cents.

ACCUMULATORS, by SIR D. SALOMONS. $1.20.

DYNAMO BUILDING, by F. W. WALKER. 80 cents.

ELECTRICAL TABLES AND FORMULÆ, by L. CLARK R. SABINE. $5.

ELECTRIC LIGHTING FROM CENTRAL STATIONS, by G FORBES. Paper. 40 cents.

ELECTRIC LIGHT PRECAUTIONS, by K. HEDGES. Illustrated. $1.

DOMESTIC ELECTRICITY FOR AMATEURS, by E. HOSPITALIER. $3.

The above will be forwarded by express, upon receipt of price. If sent by mail, postage must be added to above prices. We take especial pains in securing and forwarding any other Works that may be desired, upon receipt of order. All remittances should be made by check, draft, or post office money order.

A. M. CALLENDER & CO., 32 Pine Street, New York

GAS ENRICHERS. GAS COALS. GAS COALS.

The Despard Gas Coal Co.,

MINERS AND SHIPPERS OF

DESPARD GAS COAL,

AND MANUFACTURERS OF

COKE.

MINES, - - Clarksburgh, Harrison Co., West Va.
WHARVES, - - - Locust Point, Baltimore, Md.
OFFICE, - - - 44 South Street, Baltimore, Md.

ROUSSEL & HICKS, 71 Broadway, N. Y. — AGENTS, — BANGS & HORTON, 60 Congress St., Boston.

ENRICH YOUR GAS

WITH OUR

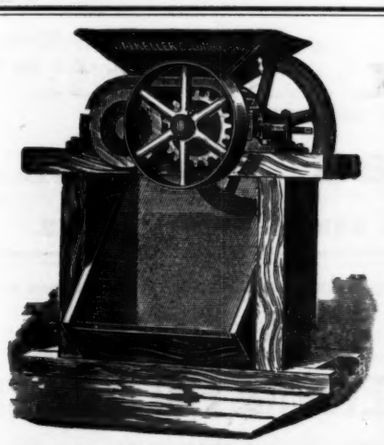
"BEAR CREEK" CANNEL

Containing

14,630 Cu. Ft. of 41-Candle Gas and 995 lbs. of good Coke per ton of 2,240 lbs.

Log Mountain Coal, Coke & Timber Co.,

PINEVILLE, KY.



Keller's Adjustable Coke Crusher

SIMPLE, STRONG, AND DURABLE.

C. M. Keller, Sec. & Supt. Gas Lt. & Coke Co. Columbus, Ind.
Correspondence Solicited.

— THE —

PENN GAS COAL CO.

OFFER THEIR

Coal, Carefully Screened and Prepared for Gas Purposes.

Their property is located in the Youghiogheny Coal Basin, near Irwin and Penn Stations on the Pennsylvania Railroad, and on the Youghiogheny River.

Principal Office:

209 SOUTH THIRD STREET, PHILA., PA.

Points of Shipment:

Pennsylvania Railroad Piers; Greenwich Wharves, Delaware River; Pier No. 1 (Lower Side), South Amboy, N. J.

EDMUND H. McCULLOUGH, Prest. CHAS. F. GODSHALL, Treas. H. C. ADAMS, Sec.

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Pa.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J.,
WATKINS (SENACA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas-giving qualities, and in freedom from sulphur and other impurities.

Principal Office, 224 South 3d St., Phila., Pa.

THE SUN OIL CO.,

OHIO CRUDE OIL,

38 to 41 Degrees Gravity.

Toledo, O., and Pittsburgh, Pa.

Standard Oil Company,

GAS NAPTHA DEPARTMENT.

GAS NAPTHA.

GAS OIL.

Correspondence Solicited

26 Broadway, New York City.

RETORTS AND FIRE BRICK. RETORTS AND FIRE BRICK. RETORTS AND FIRE BRICK.

J. H. GAUTIER & COMPANY
CORNER OF
GREENE AND ESSEX STREETS,
JERSEY CITY, N. J.
MANUFACTURERS OF
Clay Gas Retorts,
Gas House Tiles,
Fire Bricks, Etc. Etc.
Ground Clay, Fire Brick and Fire Sand in Barrels,
H GAUTIER, Prest. CHAS. E. GAUTIER, Sec. & Treas.
H. E. GREGORY, V.-Prest. DAVID R. DALY Gen'l Mang'r.

Brooklyn Fire Brick Works,
MANUFACTURERS OF
CLAY RETORTS, FIRE BRICK,
Gas House and other Tile.
Office, 88 Van Dyke St., Brooklyn, N. Y.

LACLEDE FIRE BRICK MFG. CO.,
MANUFACTURERS OF
Fire Brick, Gas Retorts,
AND
ST. LOUIS STANDARD SEWER PIPE.
Blast Furnace and Cupola Linings, every description of Fire Clay Material, Fire Clay Fine Linings, Chimney Tops Dry Milled and Crude Fire Clays, etc.
OFFICE AND DEPOT
901, 903, and 905 Pine Street,
ST. LOUIS, MO.

ESTABLISHED IN 1845.
B. KREISCHER & SONS,
OFFICE FOOT OF HOUSTON ST., E.R., N.Y.
Gas Retorts,
TILES, FIRE BRICK.
AND EVERYTHING IN THE FIRE CLAY LINE.

MANHATTAN
FIRE BRICK & ENAMELLED CLAY
RETORT WORKS
ADAM WEBER.
CLAY GAS RETORTS
AND RETORT SETTINGS
FIRE BRICKS, TILES, ETC.,
Office and Works, 15th Street and Avenue C., N. Y

Works,
LOCKPORT STATION, PA.
—ESTABLISHED 1864.—
JAMES GARDNER, JR.,
Conestoga Bldg., Wood & Water Sts.
PITTSBURGH, PA. P. O. Box 372.
Successor to WILLIAM GARDNER & SON.
Fire Clay Goods for Gas Works.
SOLE REPRESENTATIVE OF THE McILHENNY REGENERATIVE BENCHES FOR THE U. S.

HENRY MAURER & SON,
(ESTABLISHED 1856.)
EXCELSIOR FIRE BRICK & CLAY
RETORT WORKS
WORKS, Perth Amboy, N. J.
OFFICE, 418 to 422 East 23d St., N. Y
Clay Gas Retorts,
BENCH SETTINGS,
Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT.
A Cement of great value for patching retorts, putting on mouth-pieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.
PRICE LIST.
In Casks, 600 to 800 lbs., f.o.b. N. Y., at 5 cents per pound.
In Kegs, 100 to 300 lbs., " " at 6 " "
In Kegs less than 100 lbs., " " at 7 " "
C. L. GEROULD & CO.,
5 & 7 Skillman St., Brooklyn, N. Y.
Western Agent, H. T. GEROULD, Decatur, Ills.

Parker-Russell Mining and Mfg. Co.,
CITY OFFICE,
Mermod-Jaccard Bldg., Rooms 307 & 308,
Broadway & Locust St., St. Louis, Mo.
PROPRIETORS OF THE
OAKHILL GAS RETORT & FIRE BRICK W'KS
Our immense establishment is now employed almost entirely in the manufacture of
Materials for Gas Companies
We have studied and perfected three important points. Our retorts are made to stand changes of temperature, the strongest heats of the furnace, and the abrasion of feeding and emptying. We have the *exclusive Agency for the West* of the celebrated
Kloenne-Bredel Full Depth and Semi-Recuperator Benches,
And also furnish and build
Our Own Styles Semi-Recuperator Furnaces for the use of Coal or Coke as fuel.

THOS. SMITH, Prest. AUGUST LAMBLA, Vice-Prest. & Supt.
BALTIMORE
RETORT & FIRE BRICK CO.
MANUFACTORY AT
LOCUST POINT BALTIMORE MD.
Clay Retorts, Blocks & Tiles
FIRE BRICK, FIRE CLAY,
AND FIRE CEMENT.
Red and Buff Ornamental Tiles and Chimney Tops. Drain and Sewer Pipe (from 2 to 30 inches). Baker Oven Tiles 19x19x9 and 10x10x2.
WALDO BROS., 88 WATER ST., BOSTON, MASS
Sole Agents the New England States.

King's Treatise on Coal Gas.
In Three Volumes. Price per Vol., $10. Sold either by Volume or in Sets.
Standard text-book for the Engineers and Managers of Gas Works, and for all who are concerned or take an interest in the manufacture and distribution of Coal Gas, and in the utilization of the Secondary Products resulting therefrom; treating also of the Gas Engine and of Gas Cooking and Heating Appliances.
A. M. CALLENDER & CO., 32 Pine Street, N. Y. City.

FRED. BREDEL, C. E.,

PROP'R OF KLOENNE AND BREDEL PATENTS.

Recuperative Furnaces, Purifying Machines,

* Gas Apparatus. *

Main Office, 118 Farwell Avenue, Milwaukee, Wis.

New York Office, 22 Beaver Street.

Special Trays for Iron Sponge or Oxide of Iron.

CHURCH'S TRAYS a Specialty.

Reversible, Strongest, Most Durable, Most Easily Repaired.

506-310 Eleventh Avenue, New York.

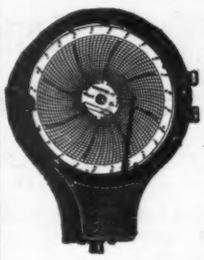
We also make the Cheapest and Strongest REVERSIBLE BOLTED TRAYS IN THE MARKET

Send for Circulars

BRISTOL'S RECORDING **PRESSURE GAUGE**

For Continuous Records of

Street Gas Pressure.



Simple in Construction,
Accurate in Operation,
Low in Price,
Fully Guaranteed.

Send for Circulars.

THE BRISTOL CO.
Waterbury, Conn.

Received Medal at World's Columbian Exposition.

E. G. LOVE, Ph.D.,

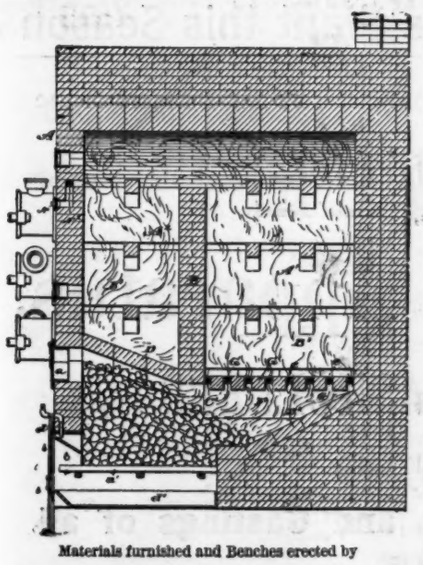
Analytical and Consulting Chemist.

Analyses of Coals, Purifying Materials, Gas, Gas Liquor, Water, and all Technical Products. Photometric and Calorimetric Determinations.

122 Bowery, New York City.

FLEMMING'S

Generator-Gas Furnace



Materials furnished and Benches erected by

J. H. GAUTIER & CO., - Jersey City, N. J.

Address as above, or D. D. FLEMMING, Jersey City, N. J.

The Miner Street Lamps.

Jacob G. Miner,

No. 823 Eagle Ave., New York, N. Y.

Bartlett Street Lamp Mfg. Co.

MANUFACTURERS OF

Globe Lamps,

FOR

Streets, Parks, Public Buildings, Railroad Stations, etc.

LAMP POSTS

A Specialty.

Office and Salesroom,

40 & 42 COLLEGE PLACE, - - N. Y. CITY

Gas Companies and others intending to erect Lamp and Posts will do well to communicate with us.

AMERICAN GAS LIGHT JOURNAL.

$3.00 per Annum.

A. M. CALLENDER & CO.

39 Pine Street, N. Y

Parson's Steam Blower,

FOR IMPROVING BAD DRAUGHT IN BOILERS, AND FOR BURNING BREEZE OR OTHER WASTE MATERIAL.

PARSON'S TAR BURNER,

FOR UTILIZING COAL TAR AS FUEL.

PARSON'S AIR JET TUBE CLEANER,

FOR CLEANING BOILER TUBES.

These devices are all first-class. They will be sent to any responsible party *for trial.* No sa unless satisfactory. Manufactured by the WATERTOWN STEAM BLOWER COMPANY.

H. E. PARSON, Supt., 621 Broadway, N. Y.

DAVIS & FARNUM MFG. CO.

WALTHAM, MASS.

PRINCIPAL OFFICE AND WORKS, WALTHAM, MASS. BOSTON OFFICE, Room 18, Vulcan Building, 8 Oliver Street.

Single, Double and Triple-Lift
GASHOLDERS
of any Capacity.

Tubular, Pipe and Sinuous Friction
CONDENSERS
of all Sizes.

STEEL TANKS for GASHOLDERS. IRON ROOF FRAMES and FLOORS.

Purifying Boxes, Center Seal or Valve Connections, Bench Work.

Reversible Lime Trays.

SELF-SEALING AND PRESSED STEEL MOUTHPIECE LIDS.

Coke Barrows, Coal Wagons, and all Apparatus Requisite for a Complete Gas Plant.

— ALSO —

GAS AND WATER PIPE, FLANGED PIPE,

Sugar House Work, and Special Castings of all Description.

Do You Contemplate Putting in any New Apparatus or Remodeling your Gas Plant this Season?

If so, write us for an estimate before placing your orders. We are Manufacturers and Builders of the

LATEST STYLE
Coal, Water and Oil Gas Apparatus,

SINGLE-LIFT and TELESCOPIC GASHOLDERS,

With or without Iron or Steel Tanks. We also make

Double Gate Valves, Street Special Castings, and Castings of all Descriptions for Gas Works.

We can guarantee all orders to be executed promptly, and in every respect satisfactory.

KERR MURRAY MANUFACTURING CO.,

Fort Wayne, Ind.

Plans and Specifications furnished on application.

BARTLETT, HAYWARD & CO.

Baltimore, Md.

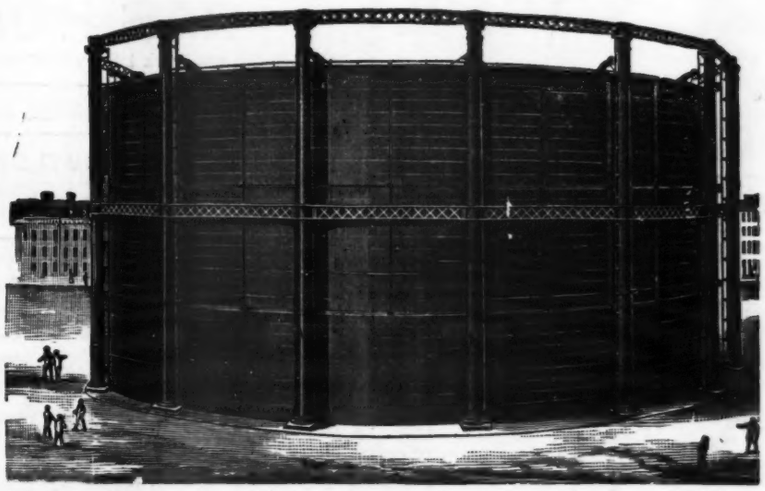
Triple Double, & Single-Lift
GASHOLDERS.

Iron Holder Tanks.

ROOF FRAMES.

Girders.

BEAMS.



PURIFIERS.

CONDENSERS.

Scrubbers.

BENCH CASTINGS.

OIL STORAGE TANKS.

Boilers.

The Wilkinson Water Gas Process.

THIRTY-CANDLE, NON-CONDENSABLE, FIXED GAS. THE MOST SUCCESSFUL GAS PROCESS IN OPERATION.

Munich Regenerative Furnace, System Drs. Schilling & Bunte.

MILL'S REVERSIBLE LIME TRAYS.

Gas Works Designed and Constructed.

THE
LUDLOW VALVE MFG. CO.,

MANUFACTURERS OF

VALVES,

Double and Single Gate, ¼ in. to 72 in., outside and inside Screws. Indicator, etc., for Gas, Water, Steam, Oil and Ammonia.

SEND FOR CIRCULAR.

SEND FOR CIRCULAR.

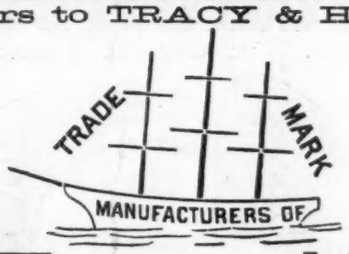
ALSO,

Hydraulic Main Dip Regulators, Check Valves, Foot Valves, Yard Wash and Fire Hydrants.

OFFICE AND WORKS:
938 to 954 River St., & 67 to 83 Vail Av.,
TROY, N. Y.

NEW YORK MARINE PAINT CO.

Successors to TRACY & HADDEN.



PAINT PECULIARLY ADAPTED TO STAND ON Holders

And all Ironwork about Gas Works.

POUGHKEEPSIE, N. Y.

GASHOLDER PAINT.

Use Only

THE GOVERNMENT WATERPROOF PAINT.

Proof against Ammonia, and Absolutely Waterproof. Send for Prices and Particulars.

HE GOVERNMENT WATERPROOF PAINT CO. 104 High Street, Boston, Mass.

CHAPMAN VALVE MANUFACTURING CO.,

MANUFACTURERS OF

Valves and Gates for Gas, Ammonia, Water, Etc.

Also, Gate Fire Hydrants with and without Independent Nozzle Valve. All Work Guaranteed.

Works & Gen'l Office, Indian Orchard, Mass, Treasurer's Office, 72 Kilby & 112 Milk Sts., Boston Mass
Chicago Office, 24 West Lake St. New York Office, 28 Platt St.
St. Louis Office, L. M. Rumsey Mfg. Co., 810 North Second St.

Foundries and Works: { Millville, N. J. / Florence, " / Camden, "

R. D. WOOD & CO.

ENGINEERS, IRON FOUNDERS, MACHINISTS

400 Chestnut Street, PHILADELPHIA, PA.

MANUFACTURERS OF

CAST IRON PIPE

SOLE MAKERS OF

THE MITCHELL SCRUBBER

(PATENTED)

PURIFIERS, CONDENSERS, SCRUBBERS.

THE HOPPER AUTOMATIC GAS GOVERNOR.

BENCH WORK. PLATE GIRDERS.

IRON FLOORS AND ROOFS.

BUILDERS OF

GAS HOLDERS

Single, Double and Tripie Lifts, with or without Wrought Iron or Steel Tanks.

PEASE'S PATENT WIRE ROPE GUIDING FOR GAS HOLDERS.

CUTLER'S PATENT FREEZING PREVENTER FOR GAS HOLDER CUPS.

THE TAYLOR REVOLVING BOTTOM GAS PRODUCER,

HEAVY LOAM CASTINGS, DUNHAM SPECIALS, HYDRAULIC WORK

LAMP POSTS, VALVES, ETC.

ISBELL-PORTER CO.,

ENGINEERS AND CONTRACTORS FOR THE

Construction and Extension of Gas Works.

FOUNDERS AND MACHINISTS.

MANUFACTURERS OF

All Ironwork and Machinery Required in a Gas Plant.

Estimates, Drawings and Specifications furnished for the Alteration, Improvement, or Extension of Existing Works or the Construction of New Works.

245 Broadway, New York City. —OFFICES— Bridge & Ogden Sts., Newark, N. J.

The Continental Iron Works

THOMAS F. ROWLAND, President. WARREN E. HILL and CHAS. H. CORBETT, Vice-Presidents. THOMAS F. ROWLAND, JR., Secretary & Treasurer.

BROOKLYN, N. Y.

TAKE EAST TENTH OR TWENTY-THIRD STREET FERRIES FROM N. Y. TO GREENPOINT.

BUILDERS OF

Gas Holders.

Single and Multiple Section Gas Holders a Specialty.

Wrought Iron Gas Holder Tanks

BENCH CASTINGS, RETORT LIDS.

Hydraulic Mains, Condensers, Scrubbers, Purifiers, Valves, Etc.

SELF-SEALING RETORT MOUTHPIECES AND LIDS,

For Round, Oval, or "D" Retorts.

Partial List of Gas Companies using our Self-Sealing Mouthpieces:

Bridgeport, Conn.	Northern, N. Y. City.	Westfield, Mass.	East Boston, Mass.	Stamford, Conn.
Charleston, S. C.	Painsville, Ohio.	Williamsburgh, N. Y.	Holyoke, Mass.	Taunton, Mass.
Central, N. Y. City.	Salem, Mass.	Buffalo Mutual, N. Y.	Palatka, Fla.	Worcester, Mass.
Gainsville, Fla.	Springfield, Mass.	Clarksville, Tenn.	Providence, R. I.	And many others.

THE MANAGEMENT OF SMALL GAS WORKS.

By C. J. R. HUMPHREYS.

Price $1.

A. M. CALLENDER & CO., No. 32 Pine Street, New York.

GAS WORKS APPARATUS AND CONSTRUCTION. GAS WORKS APPARATUS AND CONSTRUCTION.

JAMES R. FLOYD & SONS,
(SUCCESSORS TO HERRING & FLOYD)
Oregon Iron Works,
W. 20th & 21st Sts., bet. 10th & 11th Aves.
NEW YORK CITY.
ENGINEERS AND CONTRACTORS FOR THE
Construction of Gas Works.
MANUFACTURERS OF
All Kinds of Castings and General Ironwork
FOR
GAS APPARATUS.
BENCH CASTINGS, REGENERATIVE AND HALF REGENERATIVE FURNACE CASTINGS.
CONDENSERS.
TOWER SCRUBBERS.
MECHANICAL SCRUBBERS.
PURIFIERS.
MALLEABLE IRON RETORT LIDS.
SELF-SEALING RETORT LIDS.
HYDRAULIC HOIST PURIFIER CARRIAGE.
CROSSES, TEES, BENDS, ANGLES, REDUCERS, S-BENDS, SECTIONAL SLEEVES, PLUGS, CAPS, STREET DRIPS,
ETC.,
ALWAYS ON HAND.
Seller's Cement.
WOOD'S GAS SCRUBBING AND ENRICHING APPARATUS,
In use at Syracuse, N. Y.; Elizabeth, N. J.; Boston, Mass.; Watertown, N. Y.; Cortland, N. Y.; Jamaica Plain, Mass.; Northern Liberties Gas Co., Phila.
SOLE MANUFACTURERS OF THE
OGDEN QUICK-MOVING VALVE.
Plans, Specifications and Estimates furnished for Construction of New or Alteration of Old Works.

H. RANSHAW, Prest. & Mangr. WM. STACEY, Vice-Prest. T. H. BIRCH, Asst. Mangr. R. J. TARVIN, Sec. & Treas.
STACEY MFG. CO.,
MANUFACTURERS OF
Single and Telescopic Gasholders,
IRON ROOFS, BRIDGES, LAMP POSTS,
Water and Oil Tanks, Coal Elevator Cars,
COKE CRUSHERS, BENCH CASTINGS,
And all kinds of Wrought and Cast Iron Work used in the erection of Coal and Oil Gas Works.
Rolling Mill Machinery and Heavy Castings a Specialty.
FOUNDRY: 33, 35, 37 & 39 Mill Street.
WROUGHT IRON WORKS: 16, 18, 20, 22, 24 & 26 Ramsey Street,
Cincinnati, Ohio.

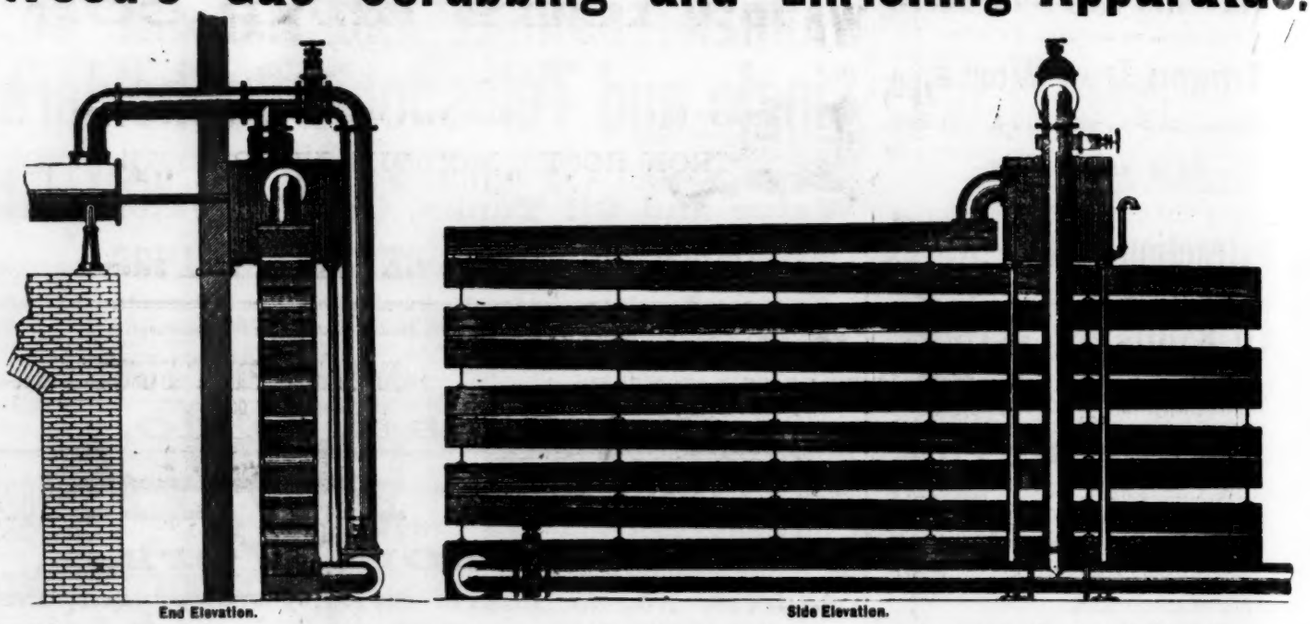
1842. DEILY & FOWLER, 1894
Laurel Iron Works.
Address, No. 39 Laurel Street, Philadelphia, Pa.
BUILDERS OF
GASHOLDERS,
Single and Telescopic.
Holders Built 1886 to 1892, Inclusive

Galveston, Texas. (3d.)	Malden, Mass.	Lancaster, Pa. (3d	Oakland, Cal.	So. Bethlehem, Pa. (2d)
Fort Plain, N. Y.	Paducah, Ky.	Tacony, Pa. (two)	Central Gas Lt. Co., New	"Vassar College," N. Y
Brunswick, Ga.	Norwich, Conn.	Mount Vernon, N. Y	York City (2d)	So. Chester, Pa.
Port Chester, N. Y.	Seattle, W. T.	Binghamton, N. Y.	Tacoma, Wash.	Cumberland, Md.
New Rochelle, N. Y.	San Diego, Cal.	Concord, N. H.	Knoxville, Tenn.	Auburn, N. Y.
Salem, N. J. (3d)	Westerly, R. I.	Dover, Del. (2d)	Pottstown, Pa.	DesMoines, Ia.
Omaha, Neb. (3d)	Northern Gas Lt. Co., of	Calais, Me.	Victoria, B. C.	Brooklyn, N. Y.
Lynn, Mass. (2d)	New York, N. Y.	New London, Conn. (2d)	Vancouver, B. C.	Washington, D. C. (2d
Little Rock, Ark.	Willimantic, Conn	West Chester, N. Y.	Charlottesville, Va.	Wilkes-Barre, Pa.
Irvington, N. Y.	Montclair, N. J.	Bay Shore, L. I.	So. Framingham, Mass.	Bridgeport, Conn, (2d)
South Boston, Mass.	Attleboro, Mass.	Washington, D. C.	Woonsocket, R. I.	Sing Sing, N. Y.
Rye, N. Y. (2)	Santa Cruz, Cal.	Newport, R. I. (3d)	Simcoe, Can.	Exeter, N. H.
Staten Island, N. Y. (3d)	Erie, Pa. (2d)	Morristown, N. J.	Pittsfield, Mass. (2d)	Wilkes-Barre, Pa., ons
Woodstock, Ont.	West Chester, Pa. (2d	Lebanon, Pa.	Chattanooga, Tenn. (3d)	Lynn. Mass. (2d) [Gas Co

ILLUMINATING GAS! FUEL GAS!
The Loomis Process.
Now in successful operation at Works of John Russell Cutlery Co., Turner's Falls, Mass., and Henry Disston's Sons' Saw Works, Tacony, Pa.
The Cheapest Gas Generating System in the World.
Plans and Estimates Furnished.
BURDETT LOOMIS, - - Hartford, Conn.

WM. HENRY WHITE,
No. 32 Pine Street, - - - New York City.
ENGINEER AND CONTRACTOR FOR THE
ERECTION AND EXTENSION OF
GAS, WATER, AND ELECTRIC LIGHT WORKS.
Correspondence with Gas Companies contemplating extending or improving their Plants respectfully invited
Plans and Estimates Furnished

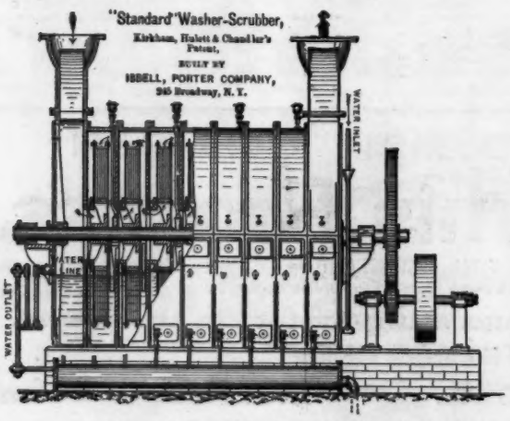
Wood's Gas Scrubbing and Enriching Apparatus.



End Elevation. Side Elevation.

The cheapest, simplest, and most effective apparatus for removing Tar and Ammonia, and enriching Gas, ever brought to the attention of Gas Manufacturers. With ordinary condensers and scrubbers the condensable illuminants flow off to the tar wells and liquor tanks and are lost, but with Wood's Apparatus these illuminants are saved and retained in the gas, thus increasing its illuminating power and making a great saving in the cost of enriching material. Where set up next after the Hydraulic main, this Scrubber produces an 8-oz. Ammoniacal Liquor.

JAMES R. FLOYD & SONS, - - Nos. 531 to 543 West 20th Street, N. Y. City.



Estimates Furnished on Application.

"STANDARD" WASHER-SCRUBBER

The only apparatus that will remove ALL the ammonia and one-third of the Carbonic Acid and Sulphureted Hydrogen from Coal Gas.

86

of these machines, capable of dealing with 75,082,000 cubic feet of gas daily, have been erected in the United States, and 456 in Great Britain. The "Standard" will save 25 per cent. to 35 per cent. on the investment through the sale of ammonia.

GEORGE SHEPARD PAGE'S SONS,

No. 69 Wall Street, - - - New York City.

FIELD'S ANALYSIS

For the Year 1892.

An Analysis of the Accounts of the Principal Gas Undertakings in England, Scotland, and Ireland. Being the Twenty-third Year of Publication. Compiled and Arranged by

JOHN W. FIELD, Accountant to the Gas Lt. and Coke Co., London.

Price, $5. For Sale by

A. M. CALLENDER & CO., - No 32 Pine Street, N. Y. City.

GAS AND WATER PIPES.

THE OHIO PIPE COMPANY,

MANUFACTURERS OF

Cast Iron Gas & Water Pipe,

BRANCH AND SPECIAL CASTINGS.

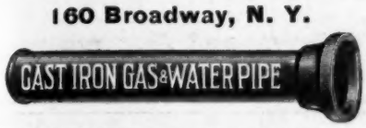
Gas-House Bench Castings, Hydraulics, Lamp Posts, Flange Pipe and Specials, Architectural Castings, Building Columns, Joists, Cellar Grates, Sash Weights, etc.

GENERAL FOUNDERS AND MACHINISTS

Columbus, Ohio.

JOHN FOX,

160 Broadway, N. Y.



SPECIAL CASTINGS, FLANGE PIPE, FIRE HYDRANTS, STOP VALVES, LAMP POSTS, Etc., Etc.

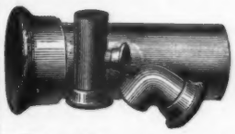
General Foundry and Machine Work.

GAS METERS.

WARREN FOUNDRY AND MACHINE CO.,

Established 1856. Works at Phillipsburgh, N. J.

New York Office, 160 Broadway.



CAST IRON WATER AND GAS PIPE,

FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Reterts, etc., etc

M. J. DRUMMOND,

SPECIAL CASTINGS AND LAMP POSTS.

Office, Corbin Building, 192 Broadway, N. Y.

GEORGE ORMROD, Mangr. & Treas., Emaus, Pa.
JOHN DONALDSON, Prest., Betz Bldg., Phila., Pa

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

THE ADDYSTON PIPE AND STEEL COMPANY,

CINCINNATI, OHIO.

CAST IRON.

PIPE.

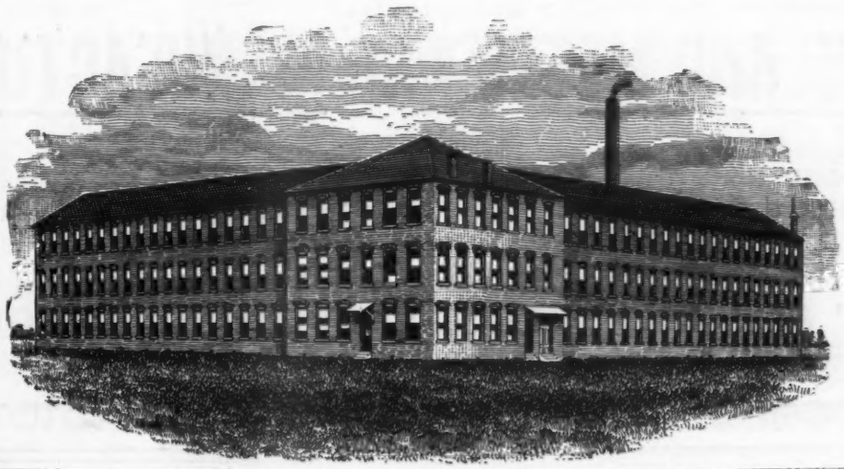
Purifiers, Condensers, Scrubbers & Center Valves

SPECIALS, FLANGE PIPE, AND LAMP POSTS.

C. N. PAYNE, Prest.

J. B. WALLACE, Supt.

F. H. PAYNE, Sec. and Treas.



Factory and Office

ERIE, PA.

ESTIMATES FURNISHED ON APPLICATION.

METRIC METAL CO.,

MANUFACTURERS OF

Dry Gas Meters

FOR ALL KINDS OF SERVICE.

Special Attention Paid to REPAIRING METERS OF ALL MAKES.

Agts., McELWAINE-RICHARDS CO., 62 & 64 W. Maryland St., Indianapolis, Ind.

JOHN J. GRIFFIN & CO.,

Nos. 1513, 1515, 1517 & 1519 Race Street, PHILADELPHIA.
No. 52 Dey Street, NEW YORK. No. 75 North Clinton Street, CHICAGO.

MANUFACTURERS OF

METERS FOR MEASURING GAS

IN ANY VOLUME.

Provers, Gauges, Registers, Etc., Etc.

EXPERIMENTAL APPARATUS FOR QUANTITATIVE AND QUALITATIVE ANALYSIS.

Careful and Prompt Attention paid to Repairing of all kinds of Meters and Apparatus.

Estimates Cheerfully Furnished.

Established 1849.

With the best facilities for manufacturing, is enabled to furnish reliable work and answer orders promptly.

NATHANIEL TUFTS,

153 Franklin St., Boston, Mass.

C. W. HINMAN, - - Manager.

MANUFACTURER OF

DRY GAS METERS.

Station Meters of any Capacity.

Test and Experimental Meters, Pressure Registers, Pressure Gauges.

METER PROVERS, PHOTOMETERS, STREET LANTERNS, ETC., ETC.

Apparatus for the Chemical Testing of Gas and Gas Liquor.

CHARLES E. DICKEY. JAMES B. SMALLWOOD. CHARLES H. DICKEY.

THE MARYLAND METER AND MANUFACTURING CO.

Established 1866.

BALTIMORE, North & Saratoga Sts. **CHICAGO, 122 & 124 Michigan St.**
NEW YORK, 838 Broadway. **SAN FRANCISCO, 221 Front St.**
BOSTON, 92 Water Street, Rooms 21 and 22.

CONSUMERS' & STATION METERS, PRESSURE GAUGES, Etc., Etc.

"Success" and "Perfect" Gas Stoves.

Established 1849.

HARRIS BROS. & CO.,

Twelfth and Brown Streets, Phila., Pa.

Agency, 67 & 69 S. Canal Street, Chicago.

Manufacturers of Wet and Dry Gas Meters,

STATION METERS, METER PROVERS,

EXPERIMENTAL METERS, SHOW OR GLAZED METERS,

Pressure and Vacuum Registers, Gauges, Photometers, Drip and Bell Pumps, Etc., Etc.

PROMPT ATTENTION GIVEN TO ALL ORDERS. METERS THOROUGHLY REPAIRED. ESTIMATES FURNISHED FOR STATION METERS OF ALL SIZES. CORRESPONDENCE SOLICITED.

GAS METERS. GAS METERS. GAS METERS.

WM. N. MILSTED, Prest. and Genl. Supt. WM. H. HOPPER, Vice-Prest. PAUL S. MERRIFIELD, Sec. and Treas.

THE AMERICAN METER CO.

Established 1834. Incorporated 1863.

WET AND DRY GAS METERS. PRESSURE REGISTERS. METER PROVERS.
STATION METERS. PRESSURE & VACUUM REGISTERS. PORTABLE TEST METERS.
EXHAUSTER GOVERNORS. PRESSURE & VACUUM GAUGES. EXPERIMENTAL METERS.
DRY CENTER VALVES. CRESSON GAS REGULATORS. AMMONIA TEST METERS.
GOVERNORS FOR GAS WORKS. MARSLAND WATER METERS. BAR & JET PHOTOMETERS.

Manufactories:
512 West 22d St., N. Y.
Arch & 22d Sts., Phila.

GAS STOVES.
SUGG'S "STANDARD" ARGAND BURNERS,
SUGG'S ILLUMINATING POWER METER,
Wet Meters, with Lizar's "Invariable Measuring" Drum.

Agencies:
380 Main Street, Cincinnati.
125 & 127 S. Clinton Street, Chicago.
810 North Second Street, St. Louis.
222 Sutter Street, San Francisco.

HELME & McILHENNY,

(Established 1848.)

GAS METER MANUFACTURERS,

Nos. 1339 to 1349 Cherry Street, Philadelphia, Pa.,

WET AND DRY GAS METERS, STATION METERS, EXPERIMENTAL METERS, METER PROVERS,

Center Seals, Pressure Registers, Governors, Indicators, Photometers, and all other kinds of Apparatus for use in Gas Works

FOULIS' PATENT STATION AND DISTRICT GOVERNORS.

REPAIRING DEPARTMENT.—We employ a special force of skilled workmen repairing meters of **all makers.**

D. McDONALD & CO.,

Established 1854.

154 West 27th Street, NEW YORK CITY.
51, 53 & 55 Lancaster St., ALBANY, N. Y.
34 & 36 W. Monroe St., CHICAGO, ILL.

MANUFACTURERS OF

Wet and Dry Gas Meters

STATION METERS, EXPERIMENTAL METERS, METER PROVERS, PRESSURE & VACUUM REGISTERS & PRESSURE GAUGES.

Meters of all makers Thoroughly Repaired.

A CONVENIENT

BINDER for the JOURNAL.

STRONG.
DURABLE.
LIGHT.
SIMPLE
CHEAP.
HANDSOME.
Price, $1.

A.M. Callender & Co., 32 Pine st., N. Y. City

The American Gas Engineer and Superintendent's Handbook.

By WM. MOONEY.

850 Pages, Full Gilt Morocco. Price. $8.00.

A. M. CALLENDER & CO., 32 Pine St., N. Y.

This Space belongs to

JOHN J. GRIFFIN & CO.,

1513-1515-1517-1519-1521 Race Street, Philadelphia.

52 Dey Street, New York.

75 North Clinton Street, Chicago.